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EDITORIAL NOTES—GAS, &c.

The Visit to Berlin—Vertical Retort Working.

NEXT Thursday night, about eighty members of the Institution of Gas Engineers will be leaving England for Berlin, where they will be the guests of their colleagues of the German Association of Gas and Water Engineers and of the Imperial Continental Gas Association, and, by the latter and the Berlin Municipality, will be afforded opportunities for making inspections of plant of great technical interest and, to the visitors, novelty. The programme for the visit is one that is highly inviting; and we feel every confidence that its realization will be equal to, if it does not exceed, the anticipation. In last week's issue of the "JOURNAL" and in the current one, we have, by brief description and photographs, and by reference, given those who will be taking part in this visit, an opportunity of making themselves familiar with the features of the gas plants they will be inspecting in Berlin, and particularly that part of them which is really the cynosure of the occasion. There is now nothing cryptic about the Dessau vertical retort system, other than in respect of certain problems that have arisen from its working, and which are, in view of practical result, of interest more from the academical side than from any other, but the elucidation of which, by the aid of chemical research, will be of value in giving direction for the future. What engineers want to know is why certain results have obtained by simply turning a retort on end that were not realized by retorts placed horizontally or at an angle; and they want to have the knowledge certified by scientific investigation, rather than accept unreservedly the declarations of theory or of superficial reasoning, however feasible they may appear.

Everything proving practicability and excellent result has been laid bare by Dr. Bueb, Herr Körting, Herr Prenger, and others; and their special articles, papers, and discussions all show a concordant tale of experience. Trial of the system, it must be remembered, has now been made in many places on the Continent, and independent of the natal works. Such large and confirmatory experience must be received with respect, though the matter of coal carbonization for gas production does not, of course, end at that. The nature of the results that have been so freely placed before our readers by Herr Körting (particularly on Jan. 14 last), and in the paper by Herr Prenger of Cologne, published in our columns a fortnight since, it will be useful to remember in Berlin. There is the high make of gas per ton of coal—with the 5-metre retorts (using steam) of an illuminating power too low for compliance with the usual standard in this country, but with the 4-metre retorts a good make of an illuminating power that will satisfy all modern statutory requirements. But this gas is, as Herr Körting's and Herr Prenger's figures have shown, of a fairly consistent character in respect of calorific power; and that power is quite high enough for all the purposes of the times. Better by far have gas of a heating power that continuously approximates 560 B.Th.U. than gas that is erratic between extreme figures. Some of this uniformity is no doubt due to the low—in these days of big makes—quantity of nitrogen that is found in the gas. In the tables in Herr Prenger's paper (*ante*, pp. 563-4), there is no figure that exceeds 4·3 per cent., and the others are lower. This is to the advantage of the consumer no matter for what purpose his gas is employed. In the gas, too, using only oxide purification, the low amount of the sulphur impurities is striking. Herr Prenger speaks of 14·6 grains per 100 cubic feet; and Herr Körting several months ago (see "JOURNAL" for Nov. 12 last) showed a 50 per cent. reduction with all kinds of coal, compared with horizontal or inclined working. The experience is altogether different from that commonly obtaining in this country with high heats and gas exposure in a considerable area of superheated free space, though Mr. Samuel Glover has just introduced in his annual report some notable figures for last year. Perhaps he will expand his information on the subject at the meeting of the Institution when Mr. Hayman's paper is under discussion, as a mean return for a year of 10·6 grains of sulphur, with a maximum of 11·5 grains, deserves explanation, as to whether carbonization or purification methods or both are to be credited with the result.

But further concerning the nature of the experiences with Dessau verticals, for present-day uses the gas produced stands high in quality and purity. The amount of naphthalene formed is such that no trouble is occasioned by it; and the discomfort of stopped pipes has been forgotten, or rather the comfort of having none is being appreciated, by those having charge of installations. With regard to the settings themselves, the amount of clinkering required is small; heats are good and controllable; the settings, it is reported, comport themselves with propriety in the matter of regularity of working; the question of wear and tear is rather more uncertain, but the omens are propitious; the working conditions of the men are comfortable; and labour is greatly reduced, though only a small amount of machinery is needed (this being a point that has struck all British visitors to Dessau and Berlin), and this again has a bearing on the charges for wear and tear. It will also be remembered, regarding the residuals, that the coke is of a harder character than is produced under ordinary conditions; the amount of breeze made is smaller; and the tar and ammonia are also increased in amount, and the former in quality. If the vertical retort-settings in Berlin were the only objects of interest that were to be seen, the compendium of results and advantages given here from the various sources of experience shows that the journey would be well worth the making.

The Profits and the Price.

WITH unexpected swiftness, the proof has been given to the gas consumers of Widnes that they did correctly in standing by the policy of the Gas Committee and the undoubted rights of the consumers to the profits made by the Gas Department, when policy and rights were threatened last November by the Bill that the Corporation have now in Parliament, and which is even at the moment "hung up" by reason of a suggestion to employ sinking funds as capital instead of raising fresh loans—this being not altogether an innovation, but certainly assailable as wrong in principle. But that is not the matter in hand. Widnes gas consumers enjoy paying prices for gas that for lowness are unprecedented; and these prices are due not so much to the fact that their Gas Department are able to obtain fairly cheap raw material, as to the wise financial administration (excepting the appropriation for public lighting from the profits) under a protecting Act of Parliament that has allowed capital to be wiped off at a fairly smart pace, and profits to be devoted partly to the capital purposes of the undertaking and partly to reductions of price. The relief that past and existing policy is to present-day consumers is shown by the extraordinarily low charges, over which, however, the Sheffield Company have been running Widnes hard. The profits that would enable this policy to be continued in future, a majority of the Council proposed in the Bill before Parliament to divert to general municipal purposes. But the ratepayers and the gas consumers would not have it; and they used their statutory power to veto the piratical intention.

Now, what is the result? Notwithstanding the price of coal last year, the Gas Department has made such a profit, and, with the reduction in the price of coal, will make a larger profit still in the current year, that the Committee have recommended, and have carried the recommendations through the Council, that the prices for gas shall be reduced to 1s. 2d. per 1000 cubic feet to ordinary consumers, 1s. to consumers of over 3 million cubic feet per annum, and 10d. to all users of gas for motive power; while slot-meter consumers are to have their allowance of gas increased from 44 to 50 cubic feet for a penny. This concession to the poorer class of

consumers is the equivalent of 2¾d. per 1000 cubic feet. Now if the gas-consuming ratepayers had not had the wisdom to veto the proposals contained in the Bill in Parliament regarding the disposal of the gas profits, this further reduction in price would, we feel safe in asserting, never have taken place at this time. The money would have been required for other purposes. But what has put the Committee in the happy position of being able to extend to the consumers this fresh consideration? There is little doubt that the increase in the sale of gas by the prepayment meter system has had much to do with further whittling down the standing, maintenance, and general management charges per 1000 cubic feet of gas sold; and all such increase in sale is therefore to the advantage of the general body of the consumers. This is a matter that is not kept sufficiently in sight when discussing the question of gas prices. Alderman H. S. Timmis, the Chairman of the Gas Committee, in the discussion of the question, commented upon the slot consumer being "rather costly to the Committee;" he might (we have no doubt that Mr. Isaac Carr would be prepared to corroborate this) have awarded the slot consumers as a body some credit for having rendered assistance, through their aggregate gas demand upon previously existing demand, in bringing about the present happy condition of affairs. When, too, councillors are discussing the prices to consumers of considerable volume, let them not forget, as certain Widnes councillors are prone to do, that per 1000 cubic feet they are less costly to supply than the smaller consumers, and that their large volume consumption has an important effect in bringing to a finer point all the general charges per 1000 cubic feet. If suddenly bereft of this large volume consumption, councillors and consumers alike would be given to understand what we mean more emphatically than can be conveyed in words.

Street Lighting Trials in the City.

THERE are all the indications that the turmoil and controversy over the lighting of the streets of the City will shortly break out afresh. There has been a report by the City Engineer as to the costs of certain experimental street lighting; and the Streets Committee have invited the City of London and Charing Cross Electricity Companies to undertake some trials of side-street lighting by means of centrally suspended arc lamps, in accordance with suggestions made by Mr. A. A. Voysey, the Electrical Engineer to the Corporation. This report was reprinted in the "JOURNAL" last week. It contains a great mass of information, including curves and data, regarding illumination tests that Mr. Voysey has made in City streets; and one conclusion that he draws from his work is that high-pressure gas lighting costs, light for light, four times as much as flame arc lighting. "Four times as "much" is rather a big difference; but the surprising thing is that this difference has a bad habit of not revealing itself in the public lighting accounts, nor does it declare itself in the costs of trial lighting as presented in the City Engineer's report (see "JOURNAL," June 2, p. 591). It may be suggested to Mr. Voysey that it would unquestionably be of advantage to the City Fathers if he would explain to them in a report, devoid of curves and illumination data—the significance of which the majority of them do not understand—how it is that flame arc lighting cannot be carried out in the City at one-fourth the cost of high-pressure gas lighting, seeing that light for light, the latter costs (so he says) four times as much as the former. This is one of the mysteries that the uninitiated finds clustering about this question of illumination in relation to price. It is a matter that would doubtless interest them, inasmuch as nowhere in the curves or accompanying statistics do the flame arcs tested disclose (excepting in spots) four times the illumination of the high-pressure gas-lamps tested, nor do the figures of the City Engineer to which previous reference has been made assert that, even with the cut prices for electricity, high-pressure gas lighting is four times more costly. The price charged for the flame arc lamps in Cannon Street—£17 10s.—was discussed in our issue for Jan. 14 last; and the figures then quoted, we think it may be claimed, fairly conclusively show that the Electric Lighting Companies engaged to do this lighting at a price that is an unremunerative one for the sole purpose of relieving themselves of the stigma that the ousting of electric arc lamps by incandescent gas-burners from certain City streets had brought upon them.

The report of Mr. Voysey, in our opinion, indicates that he has failed completely—in the work and recommendations embodied in the report—to detach himself officially from professional prejudice. For example, he draws attention to illumination Curve D, No. 3, which shows the effect of extinguishing alternate lamps in Cannon Street. The curve, he admits, does not fulfil the requirements of a well-lighted main street; but the result, he alleges, is better than can be obtained in Queen Victoria Street, and the lighting is very fair. Mr. Voysey does not, however, give a curve for Queen Victoria Street; but for Queen Street, the tests of the high-pressure lamp both on the kerb line and in the centre of the road give a minimum illumination of 0·1 candle-foot, against the 0·04 candle-foot minimum in the centre of the road of the suspended flame arc lamp tested in Cannon Street. This is one instance in which prejudice is obvious in the statement. Then, in another place, he asserts that departments other than the Public Health Department are now saving at the rate of about £3000 a year, partly by changing from gas to electricity, and partly by bringing electric lighting up to date. There is possibly no untruth about the statement; but we suggest that it would not have savoured so much of prejudice if it had been framed in another way, by defining the amount of saving by bringing electricity up to date through the fright of the Electric Lighting Companies, and, secondly, the amount saved "by changing from gas to electricity," with a statement of whether the gas lighting displaced was incandescent lighting or extravagant out-of-date flat-flame lighting, as for example was formerly used in some of the markets. The specifying of the part of the "saving" by changing from gas to electricity in the streets might have resulted in it dwindling into insignificance in comparison with the saving by bringing electric lighting up to date, and by displacing old electric lamps by incandescent gas-lamps. There is a great deal of loyalty to electricity in this report by the Electrical Engineer. But the last shot in the locker of the gas industry has not yet been fired. The Streets Committee are possibly not aware that the high-pressure gas lighting in the City does not represent the latest achievement in the development of this system of illumination; while for electricity the flame arc lighting does. The makers of the high-pressure lamps in Queen Victoria Street have lately introduced another form on the inverted system, by which from a single mantle a light of 60 to 70 candles is developed per cubic foot of gas, or at least 1500 candles per 25 cubic feet of gas consumed per hour. If there is to be change in the City, these lamps must be, in common fairness, allowed to compete both in illumination and cost with the flame arc lamps.

As has before been made clear in these columns, we have no great faith in these street illumination tests; and we are always pleased to remember that, in this connection, we are in perfect accord with the "Electrician," which not many months since expressed the opinion that "there is some "difficulty in making satisfactory measurements of low illu-"mination such as are likely to occur as minima," and "a "great deal of care is necessary in such measurements, "because an arc lamp is by no means a very steady source "of illumination." When last we referred to this declaration of the faith regarding street illumination tests that is within the leader writer of the "Electrician," it was upon an occasion when we had illumination tests in the City before us of a number of different observers; and they showed such discrepancies between one and the other that there was ample cause for rejecting the whole as untrustworthy and lacking in confirmation. The tests of Mr. Voysey add to the confusion of result by different observers, and to the divergent results given by flame arc lamps.

Let us glance at some of the lessons of the figures that Mr. Voysey has, in his recently issued report, been careful not to point out to those who will have the last word to say in determining the future lighting of the City. It is a maxim among the new school of "illumination engineers" that lights employed in street lighting should be such that the contrasts between the maximum and minimum illumination should not be great. Take the Holborn lamps (which do not meet Mr. Voysey's approval so much as the centrally wire-suspended lamps fitted in Cannon Street), the maximum illumination, under the conditions of his tests, is (in Curve A along the kerb line) 2 candle-feet, and the minimum 0·05 candle-foot, while (in Curve B along the centre of the road) the maximum is only 0·8 candle-foot and the minimum 0·06 candle-foot. The contrasts between the maximum and the minimum of a single lamp are very marked here, as well as between lamp and lamp. This fact suggests not only disuniform illumination by the use of flame

arc lamps, but a vast discordancy between lamp and lamp; and also that (we do not suggest Mr. Voysey has been guilty of this) it is possible to pick lamps that will give the most excellent results. Looking at the figures for Cannon Street (Curve A), there are such differences as 1·6 and 1·4 candle-feet maxima, and 0·1 and 0·23 minima; and (Curve B) 1·7 and 1·5 maxima and 0·1 and 0·28 minima. The contrasts, we repeat, are great between maximum and minimum illumination, and between lamp and lamp. There is yet another point. In considering the lighting by the high-pressure gas-lamp (two mantles), it must be remembered that this is only a 600-candle power lamp as compared with the reputed higher candle power flame arcs; but in Curve A along the kerb line the difference between the maximum and minimum is only between 0·76 and 0·1 candle-foot, and (in Curve B along the centre of the road) as between 0·4 and 0·1. The minimum therefore complies with Mr. Voysey's requirement; and there is not such an intense variation between maximum and minimum as the flame arcs consistently show.

Let us take another point to indicate how much reliance may be placed upon these illumination tests. The tests in Curve E were destined to show the effect of suspending the lamps at a height of 26 feet, instead of 28 feet. At 28 feet in this special test, the result was 1·37 candle-feet maximum, and 0·23 minimum; in Curve B (the ordinary tests) at 28 feet (Nos. 2 and 3) the result was 1·7 maximum and 0·1 minimum and 1·5 maximum and 0·28 minimum. At 26 feet in the special test, the maximum is 1·5 candle-feet, and the minimum 0·23. We maintain that these variable figures do not show that the higher position is slightly better than the lower one. As a matter of fact, the minimum illumination at the 26 feet height is equal to the 28 feet height in Curve E, and much better than that of the No. 2 lamp, 28 feet high, in Curve B. And, what is more, we read that "the atmo-"spheric conditions prevailing when Curves E were taken, "were distinctly inclined to be foggy." Thus (it tickles one's fancy to think of it as the curves are compared) a slight inclination to fogginess in the atmospheric conditions so far as flame arc lamps are concerned is useful in bumping up the minimum candle-feet. The character of Mr. Voysey's special pleading is very thoroughly exposed by the fact that, after stating that he has "come to the conclusion that about "one-tenth of a candle-foot is the minimum below which it "is not desirable to go in the main streets of the City," he passes over the fact that the minimum illumination in Holborn as measured by him was only from 50 to 60 per cent. of the figure below which "it is not desirable to go," with the remark that the lighting is "not very far from comply-"ing with the minimum value I think necessary." And what of the results obtained in Tower Royal by utilizing the flame arcs in the adjoining thoroughfare—with minimum illuminations of from 0·025 to 0·040 cubic foot? Is that adequate even for side-street lighting?

Mr. Voysey also, in the interests of electricity, makes a special plea for overhead wire suspension. It must be recollected that Cannon Street is a comparatively narrow thoroughfare; and the City ought not to be condemned in its wider thoroughfares to the longer wire suspension that would be necessary, and, neither in the wide nor the narrow thoroughfares, is it desirable, in the public safety and for freedom in the operations of the Fire Brigade, that the network of overhead wires should be increased in the manner suggested. How, too, are the lamps to be re-carboned during prolonged spells of fog when the lamps have to be alight night and day. A great responsibility rests on the Corporation in this matter. Any impediment to road traffic, in these days of motor cars, is also far more serious than any slight impediment to footpath traffic. This Mr. Voysey tries to minimize; but any practically minded man will recognize that the importance of the point is considerably greater than the report suggests. The saving he indicates in the cost of side-street lighting by the placing in main streets of high-power lights at the junctions with the by-streets is not the sole property of flame arc lamps. The same could, of course, be effected by high-power gas-lamps, if desirable. But is it desirable? In the event of any collapse of the electric lighting in the main arteries at these side-street turnings, the by-ways would, on dark and especially foggy nights, present dangers against which both police and public would soon protest. The destruction by fire of a building to which one of the suspension wires was attached would throw the circuit out of lighting, and give the firemen live wires to contend with. Again, is that a desirable state of affairs to bring about? Protection must not be sacrificed for the mere gain of the extreme in economy for the benefit of any one system of lighting. That would be false economy to which we believe the City Corporation will steadfastly decline to be parties.

Coalite.

OUTSIDE the Coalite Syndicate and the British Coalite Company, there is again an apparent indifference to their doings. The arresting of the attention of the public in the early part of last year was a success due to phenomenal advertising; but with the flotation of the British Company, coalite sank from public interest into utter oblivion. A circular was, as readers are aware, recently distributed among the shareholders of the Company for the purpose of stiffening their faith in the undertaking, in which circular it was stated that extensive works were being constructed at Barking to meet "the enormous and increasing demand for the fuel in the "Metropolitan area." We cannot reconcile this statement with the apathy of the Chairman and Directors of Messrs. William Cory and Son. At the statutory meeting of the British Coalite Company last September, the Chairman (Mr. Albert G. Kitching) announced, with some elation, that the Board had entered into an agreement with the firm for the purchase of coal, and for the distribution and marketing of coalite. This agreement is remembered in conjunction with the declaration of the coalite people as to "an enormous "and increasing demand for the fuel in the Metropolitan "area." Messrs. Cory and Son would, under their agreement, have surely heard of this demand had it existed; but the remarks of Sir Francis Cory-Wright at the meeting of his Company the other day, suggest that they have not. He says that, for the coalite produced at Wednesfield, there is a ready sale in the immediate district. But "none is being "sent to London, because it is all sold in the neighbour-"hood." This being so, it is singular where the enormous and increasing demand comes from in the Metropolitan area. The British Coalite Company are now erecting works at Barking; and Sir Francis states that he knows they are "expecting" before the winter sets in to have a large amount of coalite to distribute. "When coalite comes," Cory and Son "will know how to deal with it, but until it "does so, it does not trouble the Directors one way or the "other." There is a strain of dubiety about the remarks of Sir Francis, which remarks do not give much support to the sanguine views of the Coalite Directors, whose "enormous "and increasing demand" may prove to be nothing better than a phantasm. If, too, the Company are relying on the success of the London and District Electricity Supply Company's Bill in Parliament for providing an outlet for the disposal of the gas produced at Barking, they will not be very pleased to know that the chances of the scheme pulling through are daily becoming more attenuated.

The Latest Municipal Gas-Works Results.

The outstanding feature of the results of the working of municipal gas undertakings during the past year which are noticed in to-day's issue of the "JOURNAL" is the further reduction in price at Widnes; but as this is commented upon in another column, it is not necessary here to do more than refer to the matter, along with interesting points noted from other towns. At Hereford, the new Manager, Mr. W. W. Townsend, has received striking proof of the satisfaction with which his services are regarded by the Gas Committee—and also by the Council—in the raising of his salary by a very substantial sum forthwith, with a series of further annual increments to follow until a stated maximum is attained. As the Committee themselves pointed out, the increase is really an adjustment, inasmuch as the salary fixed on Mr. Townsend's appointment was a designedly low one, with the intention of giving him a substantial increase if his services were satisfactory. Their action shows that anticipations in this regard have been realized—indeed, the remarks of the Chairman of the Committee indicate that they have even been surpassed. Sales of gas have substantially increased, while the leakage has decreased; and in another direction there has been a remarkable jump in the receipts from sulphate of ammonia, though the price per ton has not greatly varied. The net profit is £1890 more this year than was the case twelve months ago, in spite of the heavy additional cost of coal, and the fact that the price of gas was not raised; and, said the Chairman, "if this was not successful management, he did not understand the term."

In agreeing with this, we may congratulate Mr. Townsend on his success. There was an increase in the quantity of gas made at Devonport of 1·32 per cent., and in that sold of 1·5 per cent. while the make per ton of coal carbonized constitutes a record for the works. In 1903, the average was 9811 cubic feet; and this amount has since steadily increased until last year 10,587 cubic feet was reached, compared with 10,224 feet in 1906-7. These results have been attained with the use of similar coals; while the Manager, Mr. J. W. Buckley, points out that the retort fittings and benches are antiquated, and no new capital expenditure was incurred. The proportion of gas unaccounted for was only 2·2 per cent. The Chairman of the Committee declined to call the statement presented a report, but said "it was a proclamation to the people of Devonport that they had in the gas-works the richest prize the town had ever known, or ever would know." At Bury, the unaccounted-for gas is also low at 3·1 per cent. The net price of gas is to be 1d. more this year, because of the increase in the cost of coal. The profits on the past twelve months' working amounted to £6000—half of which, in accordance with the practice at Bury, is divided among the ratepayers, while the other half goes back to the consumers in the shape of discount. A slight decrease in consumption was experienced at Leigh (Lancs.); but the Committee are devoting special attention to altering this state of affairs. During the past year stove-rents were abolished; and there is now under consideration the question of reducing the price of gas for power purposes, the supply of gas to districts outside the borough, and the fixing of slot installations. Coal cost more at Doncaster—11s. 8·79d. per ton, as against 10s. 6·51d. in 1906-7—but the increase was more than covered by the gain from residuals, which realized 7s. 5·34d. for every ton of coal used, or 1s. 6·51d. more than the year before. The quantity of gas sold at Tipton shows an increase of 5·29 per cent., and the leakage a decrease of 1·95 per cent. The make of gas per ton was 11,812 cubic feet.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 720.)

THE course of things on the Stock Exchange last week did not respond to the favourable anticipations which had been formed in some quarters. The markets reopened rather feebly on Tuesday after the Whitsuntide interval; and they never developed anything approaching activity all through the day. The tendency was shifty. Consols, after some fluttering, closed unchanged. Americans were very uncertain, but got steadier before the close; while Home Rails and most of the rest held on fairly. On Wednesday, an encouraging factor was the prospect of the fortnightly account promising to shape satisfactorily; but markets fell dull nevertheless. The gilt-edged division were lower; Consols losing $\frac{5}{16}$ (this was said to be in apprehension of new issues), and other departments were sympathetic in spite of the firmness of Americans. The general indications were similar on Thursday; and prices again gave way. But before the close some recovery was effected, though not to a full extent. Friday opened with the bloom of the recovery still on; but in the course of the day a "regrettable incident" in the shape of an announcement of a shortage in the Erie R.R. Company's net receipts had a bad effect, and combined with other causes to put prices down. Gilt-edged stocks were weak, and Consols fell $\frac{5}{16}$. The general tendency was flat. Saturday was a quiet day, but further falls took place. Consols lost another $\frac{1}{8}$. The extreme abundance of supply continued to be the characteristic of the Money Market, and all requirements were easily met; but discount rates were a shade firmer. Business in the Gas Market was decidedly quiet, and by far the greater part of what was done was confined to the issues of the leading Company. But the tendency was quite favourable, and almost everything that moved at all moved for the better. In Gaslight and Coke, the ordinary opened at 95¼; and, after once touching 95 free, it rose steadily until it changed hands at 97. The secured issues were firm. The maximum was done at 89, the preference at from 107⅜ to 109, and the debenture at 85¾ free *cum div.*, and 84¾ *ex div.* South Metropolitan was quiet and unchanged; transactions ranging from 118 to 119½. Commercials were not dealt in. The Suburban and Provincial group were much neglected. Bromley "A" changed hands at 119, South Suburban at 116¼ free, and West Ham at from 101 free to 101⅜. The Continental Companies were quiet also. Imperial was done at from 179¼ to 181, ditto debenture at 94 and 94⅛, European part-paid at 17 and 17⅛, and Malta at 4⅝. Among the undertakings of the remoter world, Bombay realized 6 and 6⅛, Melbourne 4½ per cent. 101, Monte Video 11¼ and 11⅜, Primitiva from 5½ to 5 15/16, ditto preference from 4⅜ to 5, and River Plate 12⅝.

Her Majesty the Queen of Holland has nominated Sir William Ramsay, K.C.B., as a member of the Dutch Academy of Amsterdam in succession to the late Lord Kelvin.

PERSONAL.

The Southampton Gas Company last Tuesday celebrated their Diamond Jubilee; and the event was made the occasion of two well-deserved presentations. The Secretary (Mr. E. W. H. Eady), after pointing out that this was the sixtieth anniversary of the Company's existence, observed that Mr. James Sharp, a former Manager of the undertaking, was the inventor of the first gas-cooker. He then made reference to the wonderful progress of the Company, and said that a meeting was held to consider what would be the most appropriate way in which they might commemorate the memorable occasion. It was unanimously resolved that, as the Chairman was the chief representative of the Company, they would like to combine and offer some token of their appreciation, which he might keep and remember in years to come. Captain Corse-Scott had been intimately associated with the Company for many years. He was Auditor in 1883; so that his record was a long one. During his (the speaker's) connection with the Company, he had had four Chairmen over him; and there was not one of them who gave greater, or as much, attention to the welfare of the Company as Captain Corse-Scott had. He hoped he would have long life and happiness, and that he might for many years occupy the position of Chairman of the Company. Mr. G. E. de la Perrelle, the youngest member of the staff, then read the following address to the Chairman, and handed him a handsome gold monogram scarf ring: "Southampton Gas Light and Coke Company. Incorporated 1848—1908. Presented, together with a gold monogram scarf ring, to Captain Alexander Jas. Corse-Scott, J.P., Chairman of the Company, on the occasion of its Diamond Jubilee, by the Secretary and his staff, the district collectors, and prepayment meter collectors, as a token of their sincere appreciation of the interest he has always manifested in the welfare of the Company's employees, and as an acknowledgment of his unfailing kindness and consideration. Ogle Road, Southampton. June 9, 1908." Mr. Alderman Bance, and other speakers, also paid high tributes to the Chairman. Captain Corse-Scott, in reply, said he believed he was the first Chairman to receive a gift from the employees; and he was getting more than he deserved. He was most gratified, and would value their present all his life. Three cheers were given; and Mr. Eady was subsequently asked to accept a handsome smoker's table as a memento of the occasion. Mr. Eady, in acknowledging the gift, said he looked upon it as a token of the kindly feeling which existed between them, and very much appreciated it. The Chairman observed that he hoped they would long be associated together in the same friendly manner they were that day.

A Cornish Gas Managers' Association.—Following the example of their colleagues in Taunton and other towns in the South-West of England, the gas managers in Cornwall recently held a meeting at Truro, and formed an Association on much the same lines as that of which the proceedings were reported in the "JOURNAL" for the 19th ult. (p. 432). The intention of the members of the Cornish Association is to exchange information monthly relating to the residuals markets, and to hold informal meetings three times a year for the discussion of subjects of interest. The former object of the Association has already come into operation, the first "exchange" having been made. The President for the year is Mr. S. J. Ingram, the Engineer and Manager of the Truro Gas Company; and the Hon. Secretary, Mr. H. H. Hoare, who holds a similar position at Falmouth. We learn that practically all the gas managers in Cornwall have joined the Association.

Presentations to Mr. R. S. Ramsden.—A pleasant function recently took place at the residence of Mr. R. S. Ramsden, the Assistant-Manager of the Burton-upon-Trent Gas-Works, when he was presented by the employees with a handsome oak sideboard, with bevelled mirror, as a token of respect and esteem. The reason for the gift was indicated in the following inscription upon a silver plate: "Presented to Mr. R. S. Ramsden on the occasion of his marriage, June 11th, 1908, by the workmen of the Burton-upon-Trent Gas-Works. Chairman of Presentation Committee, E. Simnett, sen.; Treasurer, C. P. Mudie, sen." Mr. Simnett, sen., made the presentation, and wished Mr. Ramsden and his future wife all possible health, happiness, and prosperity. Mr. Ramsden thanked the donors for their handsome present, and more especially for the spirit in which it was made. He said he looked upon his connection with them with pleasure, for since he first came among them he had received the greatest courtesy from every employee. A few days later, Mr. Ramsden was more informally made the recipient of an oak aneroid barometer by the office staff at the gas-works. It may be mentioned, in connection with these presentations, that Miss Gamble, the future bride, received from the officers and members of All Saints' Church (of which her father is a warden), and the various organizations connected with it, a silver tea and coffee service and a music cabinet in token of their regard for her. The wedding ceremony, which took place at All Saints' Church, was attended by a large assembly; and after it a reception was held in the schoolroom. Later in the day, the bride and bridegroom left for Ilfracombe, where the honeymoon is being spent. In addition to the presents mentioned above, they have received a silver cream-jug from the teachers of Holy Trinity Church Sunday School; three copper hot-water jugs from the members of All Saints' P.S.A.; and a biscuit-barrel and butter-dish from the St. Matthew's Mission Church.

THE INSTITUTION OF GAS ENGINEERS.

ANNUAL MEETING, JUNE 16 to 18, 1908.

PRESIDENTIAL ADDRESS

OF

Mr. W. Doig Gibb, M.Inst.C.E., of Newcastle-on-Tyne.

Gentlemen,—I appreciate to the fullest extent the honour which you have conferred on me by appointing me your President. As you are aware, the last appearance of your President for the time being is at this meeting—he having already taken part in the Institution's work during the preceding twelve months. With the knowledge of the responsibility for worthily upholding the traditions of the office, I started with considerable misgivings. The report of the Council will, I trust, show that much good work has been done during the period just past—work which, either finished or at least inaugurated, will raise the status of the Institution, and help forward the objects for which it exists.

If for no other reason, I am proud to be your President this year, in that I preside over a more complete Institution of Gas Engineers than has ever been before. The North British Association of Gas Managers is now amalgamated with us; and the Institution for the first time practically represents the entire industry. The happy meeting in Glasgow, when amalgamation was decided on, made me almost feel that the North British Association had, remembering I was a Scotsman, asked me to "accept this mark of friendship, warm, sincere." To again quote Burns, I trust that we may now all be "still closer knit in friendship's ties each passing year."

It is the common practice in presidential addresses to treat broadly the subjects with which the author has been more or less intimately connected; and I purpose to confine myself to a brief reference to several common subjects which have an interest to all of us. The annual meetings of gas engineers resemble, in one respect at least, the statutory meetings of prosperous companies, inasmuch as there is always one satisfactory statement to make; and that is to record the continued progress of the industry. In spite of the rumours and alarms of byegone years, the consumption of gas still increases; and the only result of the dreadful prophecies seems to be that the acute people who did not believe in the prophets now hold shares in gas concerns which are much more valuable than when the believers in the false prophets disposed of them.

Field for Gas and Electricity.

Electric supply undertakings continue, with a few exceptions, to progress; and in some cases this has probably reduced the anticipated increases in gas consumption. But severe competition has not been without its benefits, since, as was pointed out by your ex-President, the public require a more liberal standard of illumination, and gas undertakings must now be conducted on strict commercial lines and the old conservative methods be eliminated. We do not at the present time so often meet with the misleading statements of our rivals in which the candle power of the latest and most efficient electric lamp is compared to that developed by a flat-flame burner. The latest racing motor might as well be compared to Stephenson's "Puffing Billy," now enjoying a well-earned rest on a pedestal in a Northern Railway Station. Nor is there need to use such misleading statements; for if companies depended upon such, their business would have a short life. There is a field for electric supply companies; and I have no doubt they will increase and prosper as gas undertakings have done, and will do. In most of the business done by the latter, they are still without a rival in utility and price; and I do not anticipate quite such fierce competition in the future, in consequence of electricity losing its glamour and being now more often compared with gas in a logical and commercial way. When this is so, there is room for all, as there is still room for candles and lighting oils in spite of both gas and electricity. It is a matter for congratulation that, notwithstanding fierce competition and the lower individual consumptions of gas due to the introduction of incandescent burners, gas concerns have grown as they have done in past years. The growth should rather increase in the future, since, if incandescent lighting has not yet reached saturation point, it is at least a smaller factor towards reduction than it used to be.

Carbonization Questions.

A gratifying feature of the increase in gas consumption during recent years has been in the levelling of the load line. No longer are there such peaks and hollows; the filling up being no doubt largely due to the increasing use of gas for purposes other than lighting. The peaks, too, are either not growing or, at all events, are growing more slowly. This is a benefit, inasmuch as in many cases an increasing business is being done without the same necessity for spending capital which is, comparatively speaking, unremunerative, since the plant which it produces is only required for a short period in each year. But with it all, additions and new works are being constantly required; and never was there a time when the engineer who has to design such works is more puzzled to know what to do. Is he, for instance, to lay down horizontal retorts and find them obsolete before he has more than finished them, or is he to go in for some newer form and commit himself to a comparatively untried system, with the consequent risks of wasting his employers' money and of losing his own reputation? Fortunately, as regards various methods of retorting, the curtain may soon be lifted. I will not venture a premature opinion on the merits of various systems, in view of the facts that we are to have two papers read on two of the newest of these, that there is sure to be an interesting and instructive discussion on them, that we are going to Berlin to see the latest there, and that a Committee of the Institution is at present engaged in investigation which, it is hoped, will tend to make the designing engineer's task more simple.

It is an inappropriate time, having regard to what I have just said, to discuss the various types of charging and discharging machinery. We all hope for continuous carbonization, with as little auxiliary machinery as possible, and that little simple and reliable. What perhaps will be a feature common to all future carbonization systems is the application of outside producers. This is bound to simplify the construction of the retort-settings; and the experience of those who have worked them is in their favour. As with everything else in a gas-works, circumstances alter cases, and they are not so economical as the present ordinary small inside producers if they cannot be worked at, or nearly at, their full load—in other words, an outside producer should not be designed to supply fuel gas to more settings than can be conveniently treated as a unit in charging-up or in laying-off.

Large Capacity Railway Waggons.

In designing new works, the engineer must remember, in laying out his railway lines, the comparatively harmless regulations recently made by the Home Office. I say harmless because, though the first draft was a very formidable document, the strong opposition shown at the public inquiry held in 1905—and in which this Institution took part—has resulted in such general regulations as would have been observed by any gas engineer without the necessity for the intervention of the Government. A more important point to be remembered is the necessity for greater strength in the supports of overhead rails, the providing of greater side and head clearance, and the construction of wider curves with more adequate rail fastenings. These precautions are necessary, in order that the future works can handle high-capacity trucks. These, to a certain extent, are being introduced; but it would appear to be impossible at the present time to get any definite information from the railway companies as to the ultimate capacity and design of the trucks for the future. But they are bound to be of a higher carrying capacity than the present small type; and there will consequently be a greater load on the rails and a greater spreading action on the curves. No doubt the railway companies are handicapped in the introduction of the larger trucks by the capital outstanding in their present stock, in

present weighbridges and turntables, and by the opposition of traders whose private facilities for handling trucks are limited. But there can only be one conclusion formed from the following table:—

Comparison of Low and High Capacity Trucks.

Capacity of Trucks.	Tare Weight.	Length Overall.	Paying Load		Length of Train Carrying 500 Tons.	Engine Power has to Move	
			Per Cent.	Per Foot Run.		Dead Load.	Paying Load.
Tons.	Tons.	Feet.		Tons.	Feet.	Tons.	Tons.
10	6·26	19·5	62·11	0·512	975	313	500
20	8·75	23·0	69·56	0·869	575	219	500
40	16·00	41·0	71·42	0·975	513	200	500

From the above, it will readily be appreciated what the saving in traction costs to railway companies would be if the dead-weight load on every 500 tons of paying material moved could be reduced by 187 tons. The introduction of large-capacity trucks will necessarily mean an increased axle load, with the consequent necessity for strengthening the supporting roads. I regret that, owing to the various designs of the high-capacity trucks which are in use, and the want of any definite regulations on the subject, it is not possible to give any table of likely future axle loads and pitches. But it may safely be assumed that, even with the bogie system fitted to the larger and heavier trucks, the axle load may in the future be at least double what is at present the usual practice, and that the recurring greater axle loads may be at a shorter distance from one another than in the present rigid wheel base two-axle trucks. It will also be obvious that more clearance is required on the sides of railway curves if trucks 41 feet long over all are to be employed, instead of the present ones of about 19 ft. 6 in.

It would be possible to say much more on other interesting points in gas-works design; but time does not permit of my discussing and approving of tar-extractors, reversible condensers, mechanical washers, dry-seal purifiers, and spiral-guided holders. The recovery of cyanide in one form or another is becoming common. It has probably been more difficult to get accurate information about this than about any other process in use in a gas-works. I do not know whether this is due to fear that over-production might cause a serious fall in the price of an article in limited use, or only that the producers wished to be certain of their figures before making them public. At all events, I felt that a communication and a discussion on the subject might be useful; and my thanks are due to the gentleman who so willingly consented to read a paper on the subject at this meeting.

Recovery of Bye-Products.

It is impossible to read without great interest Herr Walther Feld's description of his "new method for the recovery of bye-products from coal gas separately and in a concentrated form." I am not in a position to say whether he can do all he claims to be able to do; but a summary of his pamphlet makes very fascinating reading:

1.—The cost of the plant will be 20 to 25 per cent. lower, and the space required less than one-fourth of that hitherto necessary.

2.—The operations are simpler, can be more readily supervised, and require less control and fewer men.

3.—Steam and power requirements are substantially less, as well as depreciation of plant.

4.—The special washers employed render exhausting plant unnecessary; and, in consequence, the cost of plant and the working charges are considerably reduced, and this with increased efficiency and safety.

5.—The tar is recovered in a homogeneous, uniform, and anhydrous condition; and, consequently, difficulties with distillers are avoided.

6.—Losses of cyanogen in the tar-water are avoided.

7.—Losses of ammonia in the tar, loss through imperfect washing-out, and losses in distillation are all avoided. The yield in consequence is about 20 per cent. higher than before. Pure concentrated ammonia salt liquors are produced; no ammonia distillation plant is required, nor labour in connection with sulphuric acid. The recovered ammonia salts are free from free acid and are uncoloured.

8.—Losses of benzol in the tar are impossible; the regeneration of the benzol wash-oils is almost avoided; the benzol distillation plant is less extensive, much more efficient, and can be worked continuously; and the benzol yield is higher, and the recovered products purer, than before.

9.—The requirements of water for cooling purposes are considerably less.

I can certainly vouch for the extremely ingenious special washer which he has designed to do most of the work. This machine will probably be of considerable service in ordinary gas purification and for the recovery of many bye-products; and its use will help towards the ideal condition of continuous purification *in situ*.

Had time permitted, I should have liked to refer to the benefit of using cheap acid for the manufacture of sulphate of ammonia. By means of an arsenic extracting plant, an excellent colour of ammonia salt can be obtained at a very small extra cost. A detailed description of the process may suffice for a paper at some future date. Up till now, no market has been found for the arsenic sulphide which is filtered off; but I only make this incomplete reference to the process in order to record the great assistance in this and other chemical questions which I have received from Mr. R. Forbes Carpenter, the Chief Inspector of Alkali Works, and Mr. J. W. Young, the District Inspector for the Northern District. While loyally fulfilling their duties, their desire seems to be, unlike that of some Government officials, to help the industries they are connected with by giving, often at considerable trouble to themselves, the benefit of their particular knowledge and wide experience.

Motor Vehicles for Gas Undertakings.

The great improvements made in recent years in the designs of commercial motor vehicles have made it possible to seriously consider their use in gas undertakings. The trials held by the Royal Automobile Club in September and October last were sufficient to prove their reliability; and though criticisms were not absent, these referred more to details than to any serious defects in what may be called the standard patterns. It would appear probable that for vehicles carrying up to 2 tons, internal combustion engines using petroleum spirit are the most reliable and economical; for those carrying 2 to 4 tons, either petrol or paraffin engines, or steam-engines using paraffin as fuel; and for larger weight carriers, steam-engines using coke or coal as fuel. In this latter class, it would seem to be more economical to employ a tractor and waggon than a self-contained vehicle, unless where the required speed is too high, or where the load has to be delivered in places where the tractor and waggon would be difficult to handle. My actual experience with such vehicles is as yet limited; but, as far as it goes, it is very satisfactory. A 10 to 12 H.P. light delivery lorry, costing £320, has saved, when compared to horse haulage, £282 in the first 5¼ months' work—and this after deducting driver's wages, cost of petrol, oil, repairs, and all incidental expenses. No doubt repairs will grow as time goes on, and depreciation should also be written off; but if such a vehicle saves its own cost in six months, there is a sufficient margin left for these latter items. It must be remembered that the vehicle has been kept on the work which made the highest possible saving; but it is certain that where full loads have to be carried considerable distances without breaking bulk, a very great saving can be effected by displacing horse traction in favour of motor vehicles.

Coal and Coal Testing.

It will probably be expected that, as a resident in Newcastle, I should have something to say about coal. At all events, I am often asked about the relative values of Newcastle gas coal, and more especially as to whether coal is likely to rise or fall in price. As regards the latter point, I generally find that my questioners know far more about it than I do; and I will not therefore risk being considered a failure by giving any opinion about what the future price of our staple commodity is likely to be. As regards the relative values, my experience, when compared to other people's opinions and experiences, makes me more than ever believe in the truth of the adage that "one man's meat is another man's poison." But it is a matter of common knowledge that the seams of gas coal being worked around Newcastle are not what they were twenty years ago. The grand, clean 6-feet to 8-feet seams are all but worked out, and the thinner seams are being generally worked. I do

not mean from this that Newcastle gas coal is not as good, in comparison with other coals now being worked, as it used to be. But, as I have said, the thinner seams are being worked; and it is impossible for the colliery owners, even with expensive cleaning plant and extra supervision, to supply such a uniform standard of coal as they formerly did. It is now therefore more important than it used to be to have some accurate method of testing the coals which are being delivered. It may be unfair to the coal vendor to make complaints based only on the appearance of the coal. It is certainly more satisfactory if such complaints can be substantiated by the production of test figures.

In a gas undertaking of any considerable size, it is, in my opinion, an absolute necessity to have an efficient coal-testing plant. By its intelligent use, a proper check can be kept on the coal being delivered, and much other useful information can be got to help the managers to run their works to the best advantage. The common laboratory plant which is in use is such as takes one-thousandth part of a ton as the standard testing quantity. Such a plant has, in my opinion, only one point in its favour; and that is the rapidity with which a result can be obtained. But my experience is that the results when obtained are of comparatively little value. In the business with which I am connected, there is such a small plant at each of the two works. The plants are modern, and in all essential features are similar to one another. It has been found that different tests of the same coal by the same plant give very varying results, and that it is not safe to place any reliance on a few tests, but only on an average of the figures obtained from a large number. Even when these average figures are got, they do not agree with the average figures obtained from tests of the same coal by the other plant. To some small extent, the variations in the quality of the coal may tend to produce these discordant results; but experience has shown that this is by no means the most important factor. To begin with, it is almost impossible to sample so that 2·24 lbs. weight accurately represents the bulk of the coal; and this is shown not only in the gaseous results, but in the varying percentages of ash in the resultant cokes. Apart from sampling, the temperatures of the test retort and of the atmosphere surrounding the plant have much to do with the varying results. As regards the test retort, it would appear an easy matter to have the gas supply for heating this governed to a constant output; but in practice it is found that the age of the iron retort has much to do with the amount of gas required to heat it, in consequence of the conductive power of the iron decreasing with continued use. Even if accurate sampling be assumed, it therefore follows that while the use of one such small plant may be of some assistance to the management in forming an opinion on the relative values of the coals being handled, it does not follow that the figures got will either be such as are realized from working in bulk, or be comparable with those obtained from the same coal by another operator on a different plant. But, in my opinion, accurate sampling is impossible. No doubt a clean, uniform coal will, from its consistency, reduce the possible margin of error; but such coals are not now so common as they formerly were.

For an undertaking of any size, it would appear most desirable to have what may be called a full-size plant. Possibly the best combination would be a complete plant with settings of (say) one, three, and six or eight retorts, with furnaces similar in construction to those in use on the regular works. If, in addition to this, a convenient section of the regular works can be isolated and accurate figures be readily obtained, so much the better. By the use of such a full-sized plant, the testing samples are so large as to eliminate any material error if proper care be exercised, and the testing is done in a way which much more nearly approximates to the regular routine. By its use the testing of the coke in the furnaces can also be carried out. It may be urged that the testing in such a plant would be a slow process. But a test can be done in twelve hours (six-hour clearing charge and six-hour testing charge); and I should certainly place more reliance on the figures obtained than on the average of the nine or ten small tests which could be done in the same time. An important set of figures can be obtained from a full-sized plant which are quite inaccurate if got from a small one. Readings of the yield of gas can be taken at frequent intervals during the test, and a diagram prepared from them. If, at the same time, readings are taken from a jet photometer and a diagram prepared, much useful information can be gained as to which coal carbonizes most quickly, and at what period during carbonization the richest gas is given off. This information undoubtedly helps the manager in his working, and, if for no other reason, is valuable when the ordinary retorts have to be charged at more frequent intervals to tide over an extraordinary demand.

The plant is also useful for experimental work; and the general and intelligent use of such plants might result, for instance, in retaining the valuable naphthalene as a permanent gas and prevent further attempts to solve the question of getting rid of it as a nuisance. No great efforts have yet been made towards standardizing coal-testing plants and their results. I was pleased recently to get a communication which showed that Holland was moving in the matter. At the present time the usual method of classifying the results of the tests of various coals is to arrange them according to the proportionate value they bear to a coal in the same district which is known to be of uniform and good quality. This method was advocated by Mr. G. P. Lishman, in a paper, entitled "The Analytical Valuation of Gas Coals," read before the Institution of Mining Engineers. I have for some years carried out the same practice. But while such a method may be sufficient for local purposes, it is obviously an impossible one for any scheme of general standardization. It would appear that for this purpose a purely arbitrary set of figures will have to be determined. In leaving this subject, and in case any of my hearers think I have exaggerated the difficulties of proper sampling, I should like to refer them to the bulky volumes comprising the "Report on the Operations of the Coal-Testing Plant of the United States Geological Survey, 1904."

The Coal Mines (Eight Hours) Bill.

In ordinary circumstances, I need not have taken up time by referring to a Bill before Parliament, and about which so much has been written. But the Coal Mines (Eight Hours) Bill has not yet become law; and it is impossible at the present time to pass the subject over without some reference to it. As you are aware, a deputation from our Institution waited upon the Home Secretary; and Sir George Livesey put the case of the gas undertakings to him in an able speech. Deputation after deputation has had the same tale to tell; and it appears as if there was reason to hope that, after all, the Government are not to persevere in a measure which will have, if passed, such a detrimental effect on the well-being of the country. It seems extraordinary that a Government should at any time press a measure to limit by law the hours of adult labour of a class which are, perhaps, better organized and better able to look after themselves than any other, and to do this at a time when general trade is so depressed, when employment cannot be found by vast numbers, and when so many social evils of longstanding and great magnitude call for redress. Their plea is that the miners call for it. I only know the North of England; and I have taken considerable trouble, by conversation with the miners themselves, to ascertain their views. Many are against it; some think it will be all right; but none are enthusiastic. The statement so often made—that the miners are unanimous in calling for the Bill, is far from correct. Let me quote the Northumberland voting on the question. Of 28,725 voters, 10,688 did not vote, 9251 voted for, and 8786 voted against. As regards Durham, a miners' representative in Parliament said before a Home Office Committee appointed to investigate the question that, from a purely working men's point of view, a legal eight-hour day would be one of the greatest evils that ever came into the County of Durham. Even if the miners were unanimous, is it fair to legislate for the benefit of the few to the detriment of the many? For this is what it amounts to—a tax on all coal users for the benefit of a certain class. And this class has, in the past, shown itself fully able to look after its own interests without help from a Government whose chief concern should be to hold the scales of justice straight.

High-Pressure Distribution.

In many towns where the works are shut in by the busier streets, it is becoming a very serious and expensive matter to lay new mains out from the works. The tendency seems to be to rather increase the initial pressure. I believe in high pressures, and would like to see all the extremities of the outlying mains in my district show a minimum pressure of 2 inches. This is required if gas-fires, modern burners and cookers, and gas-engines are to be used to the best advantage. But in Newcastle this now entails, in the hours of heaviest consumption, such an initial pressure as to practically

render quite useless one-third of the storage power, since the last lifts of the holders will not give the pressure required. To bring this lost storage into use again, I have experimentally laid down fans at one of the works; and from their satisfactory working it is probable that other sets will follow as required. The plant is in duplicate, and consists of two 56 B.H.P. gas-engines driving two 30 kilowatt continuous current dynamos for 250 volts, the current from which drives two electric motors for 250 volts coupled direct to two straight-line delivery fans; the necessary switch-boards, automatic "no voltage" and "overload" releases, 200 ampere fuses, &c., being also in duplicate. Bye-pass gas connections are provided between the fan gas inlets and outlets. The engines have a normal speed of 210 revolutions per minute; the dynamos 900 revolutions. When a motor and fan is running at 2750 revolutions, the brake-horse-power applied at the spindle of the fan is approximately 24; and this requires the engine to develop 35 B.H.P. At 3100 revolutions, the relative figures are 35 and 47 B.H.P. I give below the guaranteed figures which were required for each single plant, as also the official test figures, since a comparison between the two is interesting from the fact that the guarantees were so easily fulfilled.

Test Figures.	No. of Revolutions of Motor and Fan per Minute.	Amperes.	Volts.	Delivery per Hour. Cubic Feet.	Gas Pressure at Inlet of Fan.	Gas Pressure at Outlet of Fan.
		To work to			Inches.	Inches.
Guaranteed .	2750	200	250	300,000	4 to 6	13½
Actual . .	2400	82	245	399,600	4	16

Note: The controlling gear had to be such as would enable motors and fans to be driven at all speeds between 2500 and 3100 revolutions per minute. This was easily accomplished.

A few questions on what I have just said naturally suggest themselves. I have not found that the percentage of leakage has increased with increased pressures. There may have been a volumetric increase of leakage; but if so, it is counterbalanced by the percentage being calculated upon increased sales. The reason for adopting an electric drive was the necessity for having a balanced motor in consequence of the fans delivering direct into the distributing box of an adjacent governor-house. A steam turbine drive would have done equally well; but the fans are not near to any suitable steam-boilers in constant use, and as the fans will run at irregular intervals, and sometimes for only one hour in the twenty-four, steam power could not have been so quickly brought into action or been so economical. The bye-pass connections, in addition to their ordinary purpose of cutting out the fans for repairs, are also handy in starting the plant. They then stand open; and when the fans are first started the gas is churned round without going forward. A slow closing of the valves enables a very gradual extra pressure to be put on to the distributing box of the governor-house. The fans give an ample pressure with a considerable reserve, and so are preferable to any positive machinery, because, being of the open type, any stoppage does not prevent the gas going forward at holder pressure, and there is no risk of causing such a vacuum behind them as would wreck a holder if it grounded with the machinery exhausting from it.

Automatic Street Lighting and Extinguishing.

An experiment with some 500 installations for street lighting and extinguishing by "pressure waves" from the governor-house has been conducted for some time in a portion of the Newcastle district. No accurate data can yet be quoted; but everything goes to show that there is now reliable plant on the market to accomplish the desired end. With over-loaded mains, it is certainly preferable that the method employed should be designed to work by increased pressures rather than by decreased ones. When only the gasholder pressure is available, over-loaded mains, when working "increased pressure" plants, tend to prevent one source of saving, inasmuch as if the time of lighting up is cut too fine a sudden darkness, and consequent larger general consumption, may prevent the necessary extra pressure reaching the fitted lamps. With fans, or some such forcing machinery at hand, this can, of course, always be remedied.

Relative Hygienic Values of Gas and Electricity.

For many intricate and expensive investigations, the gas industry is indebted to the London Gas Companies. It will be known to most of my hearers that Dr. S. Rideal was recently employed by them to make a thorough investigation into the relative hygienic values of gas and electric lighting. The voluminous and most complete report which was the result has been published, and is procurable at a small cost. I can do no more than refer my audience to this book, in the belief that a careful study of it will result in much valuable information being acquired.

Training of Young Engineers.

Many more interesting subjects might be touched upon; but I must close with two which have a peculiar interest to me. I need not again go over the ground covered by former expressions of my opinion in regard to the education of young men as gas engineers, unless to repeat my belief that the best man, and the one most likely to succeed, is the one who has had an engineering workshop training as well as a theoretical training and an experience in a gas-works. In this connection, I am surprised at the claims of technical colleges that their so-called workshop training is as efficient as ordinary workshop practice. I have yet to see it; and I believe that a young engineer will learn more in a month in a proper "shop" than he will learn in a year in a college workshop. The report on the "Education and Training of Engineers," adopted by the Council of the Institution of Civil Engineers in 1906, contains a great deal of useful information; and as the report is really a concensus of the opinions of many well-qualified to speak on the subject, I should be rash to criticize it in detail. But it should be remembered that a gas engineer's work probably embraces more than usually falls to the lot of a purely civil engineer, and that, in consequence, his best training may vary from that which is set out in the report. It is also not within the power of every young man to carry out such an expensive programme in equipping himself for the battle of life. But, given health, much can be done in a limited time if the necessary determination is there; and in one respect, it is better far for him than the more leisurely and expensive way, because he will have had one grand piece of training—the getting the better of the obstacles barring his way, which may serve him well in after life. Having regard to my interest in this subject, I felt compelled to accept the honour which your Council showed me when they nominated me as Examiner in Gas Engineering to the City and Guilds of London Institute (Department of Technology). But, in common with Mr. A. F. Browne, my predecessor, I believe it is not expedient for the same man to hold the office too long, but rather, by occasional changes, to vary the individualism of the Examiner in the interests of the students.

The Benevolent Fund.

You have all, I hope, seen this year's report of the Benevolent Fund Committee. The expenses of the year are more than the income; and this result is in spite of giving smaller grants than many of the cases called for. It will be noticed that much good has been done to the fund by the energetic efforts of Mr. Meiklejohn; and it is hoped that similar work will be done by friends of the fund among the members of the other Associations. Might I suggest that the various Associations should consider whether they could not each, from among themselves, form what I may call a Local Committee to press the claims of the fund among their members, and to assist the Committee in letting them know at once of any deserving case in their district, and also to supply information from time to time about local cases. If some such scheme could be carried out, more money would be available and greater justice could be done. There is certainly room for some such movement when it is realized that the total subscriptions to the fund for this last year are equal to an annual contribution from each member of 2s. 11d.

Already too long, I still must say a parting word of apology. My address is not deep—I did not intend it to be. I rather aimed at its being a light introduction to the more solid fare which is to follow; and, above all, I desired to avoid definite reference to any controversial subject, which, in my opinion, is best dealt with in a paper open to discussion.

The death occurred recently at Cherbourg (his native town) of Mr. L. G. Mouchel, who in 1898 acquired from M. François Hennebique the sole agency in the United Kingdom for his system of ferro-concrete construction. About a year ago, he took into partnership Mr. J. S. E. de Vesian and Mr. T. J. Gueritte; and since then the business has been carried on under the style of L. G. Mouchel and Partners, Limited.

THE RETIREMENT OF MR. HENRY HACK.

Presentations by the Gas Committee, the Works Engineers, and the Clerical Staffs.

In connection with the recent relinquishment by Mr. Henry Hack of the position of Engineer-in-Chief of the Gas Department of the Birmingham Corporation, resolutions recognizing his long services, and conveying good wishes for the future, were passed by the Gas Committee and by the Works Engineers and their clerical staffs. By a thoughtful arrangement, copies of the resolutions, beautifully illuminated, in album form, were forwarded to Mr. Hack on the 65th anniversary of his birthday (the 29th ult.); and he was thus made the recipient, on the day of his retirement, of two very pleasing *souvenirs* of those with whom he had been associated in the great undertaking he was leaving. The outside of the Gas Committee's album bore the words: "To Henry Hack, Esq., M.Inst.C.E., on his Retirement from the Service of the City of Birmingham Gas Department, 29th May, 1908;" while on the first and second pages inside was the following resolution:—

CITY OF BIRMINGHAM.

At a Meeting of the Gas Committee held on the 11th day of May, 1908, it was

RESOLVED.

That this Committee place upon record their high appreciation of the able, faithful, and strenuous services rendered by the

ENGINEER-IN-CHIEF,

HENRY HACK, ESQUIRE, M.INST.C.E.,

during his 32 years' service with the Department; and they desire to express the hope that he may long enjoy his well-earned retirement. (Signed) HALLEWELL ROGERS, *Chairman*.
G. HAMPTON BARBER, *Secretary*.

[Copy of the arms of the city here.]

The album from the Works Engineers and their clerical staffs had upon the outside the words: "To Henry Hack, Esq., M.Inst.C.E., Engineer-in-Chief, from the Members of his Works Staffs, May 29, 1908;" and inside was the following inscription:—

TO HENRY HACK, ESQ., M.INST.C.E.,

ENGINEER-IN-CHIEF, CITY OF BIRMINGHAM GAS DEPARTMENT.

We, the members of the staffs of the City of Birmingham Gas-Works, hereby convey to you our hearty congratulations on the occasion of your attaining the age of 65 years.

We also, upon the eve of your retirement from the position of Engineer-in-Chief, after 36 years' most honourable and strenuous work with the Gas Department, take this opportunity of wishing you farewell, and expressing the hope that you may long be spared to enjoy your well-earned rest, and that the future has in store for you both good health and happiness.

BIRMINGHAM, *May* 29, 1908.

The foregoing was signed by each of the Works Engineers and by a total of 87 (practically the whole) of their staffs.

These handsome presents were gratefully acknowledged by Mr. Hack, who expressed his cordial thanks for the kind words they contained.

THE PATENT OFFICE IN 1907.

Beyond the customary statistics with regard to the work of the year 1907, the twenty-fifth annual report of Mr. C. N. Dalton, the Comptroller-General of Patents, Designs, and Trade Marks, deals at some length with the Patents and Designs Act which received the Royal Assent last August. The principal point of this Act, of course, is the effort which it makes to put a stop to the practice hitherto indulged in by those living abroad of taking out patents in this country, not to work them here, but, as the Comptroller says, with the object of preventing British manufacturers from producing articles which might compete with them, either in their own or other markets. Now, at any time not less than four years after the date of a patent, and not less than one year from the passing of the Act, any person may apply to the Comptroller for the revocation of a patent on the ground that the patented article is manufactured, or that the patented process is carried on, exclusively or mainly outside the United Kingdom; and if the allegations are substantiated, and "satisfactory reasons" for the default are not forthcoming, the patent may be revoked. It is stipulated also that every ground on which a patent may be revoked by the Comptroller shall be available by way of defence to an action for infringement, and shall be a ground of revocation by the Law Courts. Already, as we know, the Act has been responsible for important moves on the part of foreign manufacturers, so as to put themselves within its provisions; but the enormous scope that still remains for action in this direction may be gathered from the fact that a notice pointing out the effect of this amendment of the law has been sent out to nearly 70,000 inventors, whose patents are in force in this country.

The Act, of course, contains a large number of other provisions. Among these, it may be mentioned, the Board of Trade may be petitioned for the grant of compulsory licences, or in the alternative for the revocation of patents, on the ground that the reasonable requirements of the public with respect to an invention have not been satisfied. Hitherto patentees, it had been held by the Courts, were entitled to impose any conditions, however unreasonable, on the sale or lease of articles manufactured under their patents. Then with the object of checking applications for speculative patents for alleged inventions based only on chemical theories, and not submitted to the test of experiment, it is provided that, where the invention in respect of which an application for a patent is made is a chemical invention, such typical samples and specimens as may be prescribed shall, if in any particular case the Comptroller considers it is desirable, be furnished before the acceptance of the complete specification.

Coming to the particulars of last year's work of the Patent Office itself, it is seen that there was in 1907, as compared with 1906, a slight falling off in the number of applications for patents, but an increase in the complete specifications filed. The figures for the last four years have been: 1904—applications, 29, 702; complete specifications filed, 15,925. 1905—27,578 and 18,806. 1906—30,030 and 18,243. 1907—29,040 and 18,893. Thus the applications last year were 3·3 per cent. less than in the preceding twelve months, which, however, showed an increase of 8·8 per cent. when compared with 1905. There was also a slight falling off last year in the always very small number of applications received from women inventors—possibly owing to their energies having been concentrated on some other object. The number of such applications was 560 in 1907, and 600 in the previous year. Of all the applications for patents the number received from persons resident in England and Wales was 17,380 (a decrease of 6·5 per cent. on 1906), from Scotland 1278 (a decrease of 2·2 per cent.), and from Ireland 349 (a decrease of nearly 8 per cent.). As regards the Colonies, there was a falling off in the number of applications received from every State of the Australian Commonwealth except New South Wales, and also in those from Natal and Hong Kong. Canada sent nearly the same; and in numerous other cases there were small increases. Once more the foreign country supplying the largest number of applications was Germany, with 3341, as against 3253 in 1906. The United States came second, with 3104 (against 3003); and France third, with 1042 (against 1002). Patents were sealed upon little more than half—54·2 per cent.—of the applications made in the year 1906; while no more than 4·3 per cent. of the patents sealed upon the applications made in the year 1894 were maintained for the full period of fourteen years.

As to the subject-matter of the patents, the output of inventions in connection with the motor-car industry at last shows signs of falling off; but increased activity is noticeable in other directions in which public attention has been engaged. For example, we learn that "the sudden popularity of the old toy 'the devil on two sticks,' under the name of 'diabolo,' gave rise to a considerable number of applications for improvements in the 'spool,' &c.;" though it is added that in most cases these have not proceeded beyond the provisional stage. Another, and more useful, matter to which the attention of inventors has been directed is the improvement of devices for preventing a mine or lift cage from falling down the shaft in the event of its hoisting-cable breaking; while attempts to solve the flying-machine problem have also been very much in evidence, and increased attention has been given to the subject of wireless telegraphy. For the purpose of classification, the Patent Office collect the inventions under 146 heads; and the number of published complete specifications in the classes in which "JOURNAL" readers are more specially interested for 1905 and 1906 are as follows—the figures for the former year being placed in parentheses: Air and gas engines, 612 (465); cooking, &c., 144 (140); gas distribution, 59 (51); gas manufacture, 214 (192); heating, 262 (261); and lamps, &c., 453 (474).

Last year the receipts from patent fees were £265,012, as compared with £255,646 in 1906; from designs fees, £5473, against £4344; and from trade marks fees, £18,447, compared with £15,559. The receipts from the sale of publications were £11,457—making the total receipts £300,389, as against £286,142 for the preceding year, or an increase of £14,247. On the other hand, the expenditure, at £176,230, showed an increase of only £958.

Presentation to Alderman Gainsford.—It may be remembered that when, towards the close of last year, Alderman Gainsford resigned the chairmanship of the Water Committee of the Sheffield Corporation, the City Council placed on record, in the form of a resolution, their obligations and thanks to him for his long service, extending over 21 years, in connection with the water undertaking. It was also decided that the resolution should be embodied in an illuminated address, sealed with the corporate seal, and presented to Alderman Gainsford. The work having been most artistically executed by Miss Genevieve Pilley, the presentation was made in the Town Hall last Thursday by the Lord Mayor (Alderman H. P. Marsh), whose good wishes expressed for the recipient were heartily endorsed by Alderman Styring, the Chairman of the Water Committee. In returning thanks for the address, Alderman Gainsford said it was a satisfaction to know that Sheffield's first experiment in municipal trading—the acquisition of the water-works—had been successful. When they took them over, it was very doubtful indeed what the result would be; and the majority of people thought it would be a failure, or, at any rate, that the concern would just jog along unprofitably. But it had been quite otherwise; and he attributed the credit for this to Mr. Terrey, the Manager. Sheffield had itself to thank first, and Mr. Terrey next, for the success of the water undertaking. He concluded by expressing his obligations to the Lord Mayor, to the City Council, and to Alderman Styring for their kindness.

THE TEGEL GAS-WORKS OF THE BERLIN CORPORATION.

As promised in last week's issue, in view of the forthcoming visits—first of the German Association of Gas and Water Engineers, and later of their guests of the Institution of Gas Engineers—to the Tegel works, which are the newest and most important of the six gas-works belonging to the Municipality of Berlin, we have prepared the following description from accounts of the works which have been given in the "Zentralblatt der Bauverwaltung" and the "Journal für Gasbeleuchtung."

The gas undertaking of the Berlin Municipality celebrated its Jubilee in 1897. It then owned five works, situated respectively in the Stralauer Platz, the Gitschinerstrasse, the Müllerstrasse, the Danzigerstrasse, and in Schmargendorf. By 1902, however, it was seen that these works could not continue to suffice to meet the increasing demand for gas, and a new works in the Tegel-Wittenau (Dalldorf) district was started. Here it was intended not only to make coal gas, as in the older works, but also to work up gas liquor and make water gas. The works were planned for a total ultimate output of 27½ million cubic feet per diem. By the end of 1905 one-third of the works was completed, and manufacturing operations started then. The site selected was a strip of land stretching from the Tegel lake to the Berlin-Cremmen railway line, divided into three sections by two roadways—viz., the Schönebergerstrasse and the Berlinerstrasse, of which the latter is the more important (see plan, fig. 1, to which references are given below by the numbers in brackets). It was decided therefore to put the coke-depôt (30) adjoining the latter. The coal, on the other hand, would reach the works mainly by water; and, therefore, the coal-store (22) was placed near the Tegel lake. The chief gas-main from the works passes along the Berlinerstrasse; and therefore the gasholder (17) and governor-house (6) were arranged at that, or east, side of the works, on which side also is the purifying-house (5). On the west side, adjoining the quay, are the appliances for unloading coal, and the coal and general stores. In the middle portion of the works, lying between the two roadways, there are the retort-houses (26 and 27), the condenser-house (28), coke-stores and coke-handling plant (30), the power-house (31), and the workshops. Thus each portion of the works has allotted to it special and distinct work, while the interdependence of the various parts is not in the least interfered with. The constructional work was planned so that the subsequent extensions would interrupt the working of the first section as little as possible.

The quay is large enough to admit of at least two 600 ton vessels—the largest admissible—discharging coal at the same time, as well as a third vessel discharging materials such as fire-bricks, oxide, &c., and a fourth vessel loading coke. There is, further, sufficient room in the harbour for a vessel which has already discharged its cargo to pass out, and for barges to enter. The canal which connects the harbour with the Tegel lake is spanned by a road-bridge, as seen in the plan fig. 1. The unloading and loading of the vessels is done entirely by machinery. The coal-store, fig. 1 (22), is intended to ultimately hold about 300,000 tons. The first section is 164 feet wide and about 1970 feet in length. In order that heated coal may readily be removed from any part of the store, it is built on the silo principle—that is to say, the compartments have underground outlet conduits. Further, there are arrangements for storing the coal in layers; so that wet coal may dry before another layer is put on it. This precaution affords great protection from spontaneous ignition of the coal.

The carbonizing plant comprises settings of inclined retorts of large cross section, 16·4 feet in length. The retorts are in beds of nines; and eight beds are built in one bench. There are five benches in each of the two retort-houses—fig. 1 (26 and 27). The charging-stage is seen in fig. 2, and the drawing-floor in fig. 3; while fig. 5 shows the gallery adjoining the hydraulic main, with the foul main overhead. The cross section of one of the retort-houses given in fig. 4 shows that the aim has been to make the house as light and airy as possible, to put the stokers' lobbies and the bath-rooms as near as is convenient to their work, and to have all the plant readily accessible. The De Brouwer coke-conveying trough is used in the various Berlin Gas-Works in every conceivable position and arrangement; but the plan now adopted and shown in the cross-section is that which appears the best. In the works' buildings generally, upper floors have been as far as possible avoided—the purifier-house and the condenser-house being only one-storey buildings. Where floors have been unavoidable, they are as open and light as possible, so as to be permeable to gas and easily removed; and the materials used are non-inflammable. The coal-breaking plant (24) is in front of the retort-houses; and at the opposite end is an air-cooled tar-separator (29). The retort-houses are on the middle section of the works; and when the scheme of construction has been completed, they will form one large retort installation, about 660 feet wide and 755 feet long, with the railway passing through the middle, and with seven free spaces for access of light and air. The condenser-house (28) not only contains the condensing and scrubbing plant, but also the cyanogen and naphthalene extractors. There is room also for centrifugal tar-extractors, should need arise for them. The coke yard is of ample size; the width of each section between the encircling suspension line being 164 feet, and the length about 660 feet. At the end is the coke preparing and sorting plant (30). The screened coke is stored in elevated tanks for loading into carts and trucks; and the breeze is taken to the adjacent boilers, of which there are already in use eight of the water-tube type, each having a heating

1. Gas-Exhauster and Governor [House.
2. Sprinklers.
3. Locomotive-Sheds.
4. Sand-Washing Buildings.
5. Purifier-House.
6. Governor-House. [Tank.
7. Engine-House and Clean-Water
8. Filter and Clean-Water Tank.
9. Tar and Liquor Tank.
10. Water Tower.
11. Ammonia Works.
12. Filter-Press House.
13. Sulphate, &c., Store.
14. Experimental Plant.
15. Laboratory.
16. Skips.
17. Gasholder.
18. Officer's House.
19. Cesspools.
20. Coke-Loading Plant.
21. Wells.
22. No. 1 Coal-Store.
23. Coke-Loading Plant on Quay.
24. Coal-Breaking Plant.
25. Coal-Distributing Plant.
26. No. 1 Retort-House.
27. No. 2 Retort-House.
28. No. 1 Condenser House.
29. Tar-Wells.
30. Coke-Handling Plant.
31. Power Station.
32. Manager's House.
33. Offices.
34. Entrance Hall.
35. Workmen's Lobbies.
36. Porter's Lodge.
37. Bridge.
38 and 39. Stores.
40. Coal Unloading Plant.

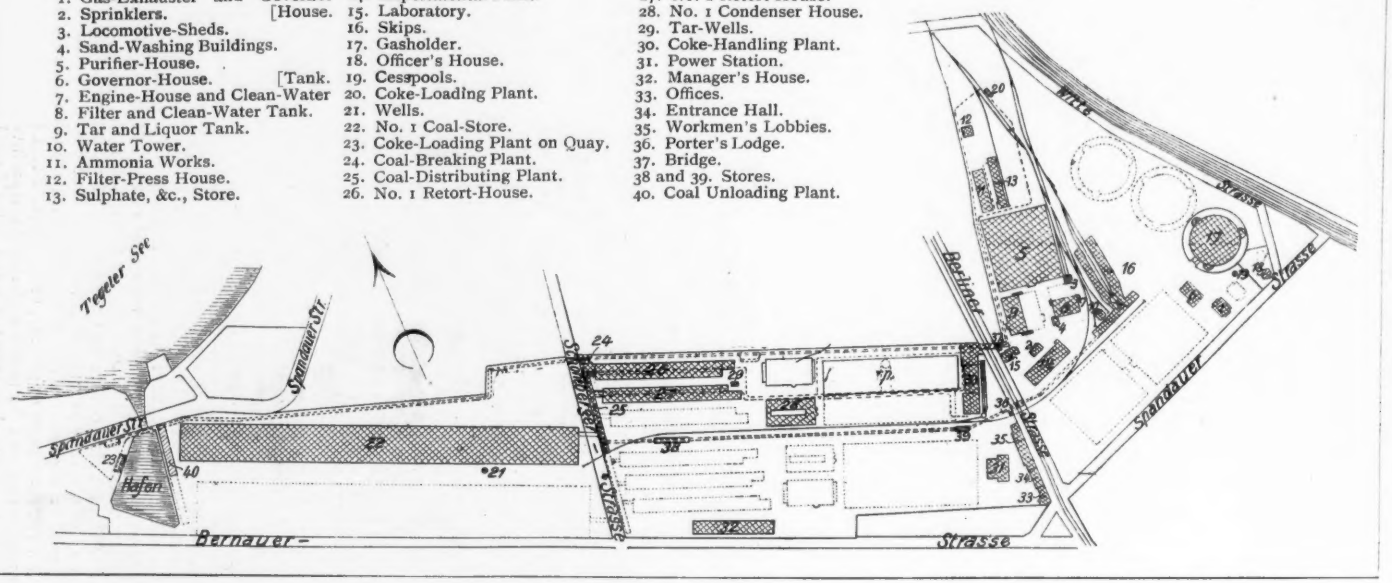

Fig. 1.—Plan of the Works.

Fig. 2.—View on the Charging Stage.

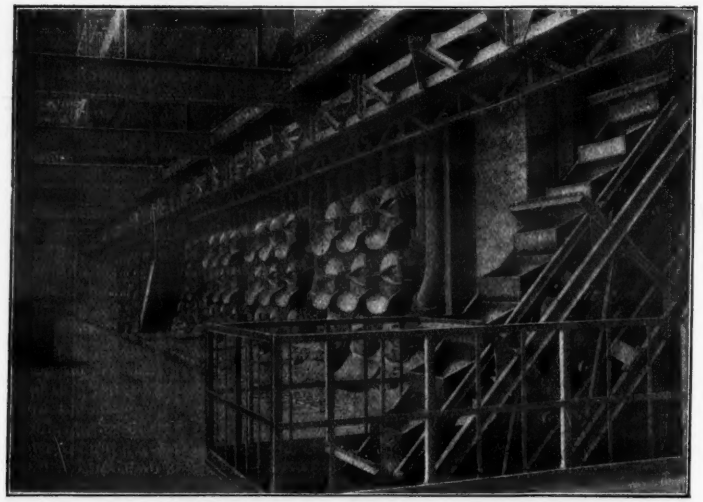

Fig. 3.—View on the Discharging Side of the Benches.

surface of 1076 square feet, and steaming at 10 atmospheres pressure. The boiler-house, with the suspension line, is shown in fig. 6.

The purifier-house (5) contains in each half two sets of four vessels, each 65 ft. 6 in. long and 26 ft. 3 in. wide. Between the two halves are placed two station meters, which enable the two streams of gas to be measured separately. There are to be three gasholders, each of nearly 5 million cubic feet capacity. The first one completed—17 on plan, and figs. 7 and 8—has a tank 246 ft. 9 in. in diameter. The gasholder bell comprises four lifts, each 31 ft. 2 in. deep; and its total weight is nearly 690 tons. The highest point of the holder is 236 ft. 3 in. above the ground level. The roof has 32 main rafters, with numerous ties, and is 249 ft. 4 in. in diameter and has a rise of 50 ft. 3 in. The wall of the gasholder house has been calculated as though it were an iron guide framing. It has the advantage of directly taking up the wind-pressure, and its weight admits of a considerable diminution of the thickness of the walls of the tank. The brickwork of the gasholder house was started on the masonry of the tank wall; the roof girders first of all resting on the latter. After the wall had been brought to a height of 40 inches, the roof framing was raised up to it by means of 36 hydraulic jacks, and so on, stage by stage, to the full height. Three scaffold towers (fig. 7) were erected for raising the materials that were used in construction.

All the connections in the condenser and scrubber house are carried over the apparatus, so that an elevated floor is avoided, while ready accessibility is secured. In the purifying-house, they are laid on the ground beneath a readily removable floor. Roofs are generally of spaced tiles, which afford a safety-vent in case of explosion. Experience has shown that slated roofs offer more resistance to explosions than the walls of the building; so they have been avoided. The engines and apparatus for transmitting the gas through a 48-inch main to the holders at the Müllerstrasse works are contained in a house (1 in the plan). Up to about 3½ millions per diem, the holder pressure suffices for transmitting the gas along this main. Above this quantity, the gas is pumped; governors and regulators being used to control the flow according to the position of the holders at each end of the main. A portion of the gas is taken from the 48-inch main direct into the distributing system. Another portion of gas is distributed direct from the Tegel works to the Reinickendorf district.

The tar and liquor tank (29 on plan) adjoins the condensing and scrubbing plant (28). The liquor storage tanks (9) are on the eastern section of the works; while in the lower stages of the water-tower (10) are two liquor-tanks, and above them is a tar-tank. The water reservoir is at the top of the tower. The

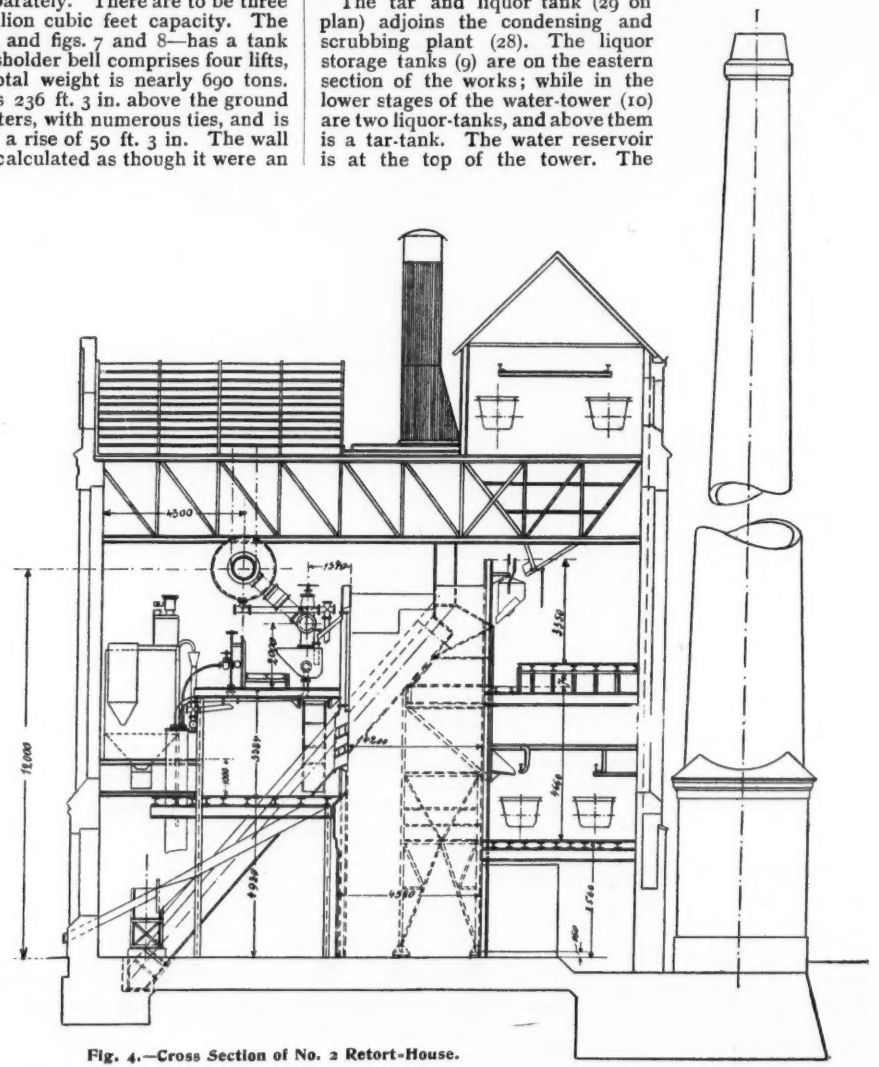

Fig. 4.—Cross Section of No. 2 Retort-House.

ammonia works (11), the sulphate store (13), and the chemical laboratory (15) are conveniently near the tar and liquor tanks. The ammonia works contain stills for working up the liquor to sulphate or concentrated liquor, and also plant for preparing liquor ammonia. Sulphuric acid stores and the purifying plant for the exit gases from the saturators adjoin the sulphate-store. The laboratory is intended for research work for the whole of the Berlin gas undertaking, as well as for the routine tests for the Tegel works. In the basement, there are rooms for furnace work, cement testing, water-stills, pulverizing materials, a motor, and stores. On the ground floor are a large and a small laboratory, a physical laboratory, balance room, office and library, and on the first floor two photometer rooms—a room for durability tests of burners and mantles, a gas-analysis room, and apparatus store rooms. The second floor comprises dwelling rooms for the resident chemist.

The experimental works (14 on plan) contain a retort-setting for coal testing, and condensing and purifying plant in connection therewith, rooms for testing new types of retort-settings, and testing rooms for materials and bye-product recovery processes. The offices (33 on plan) face the Berlinerstrasse, and adjoin the covered main entrance to the works. The three sections of the works are joined by bridges traversing the public roadways, and over these bridges are carried the gas, water, and steam pipes, electric cables, and suspension conveyors. There are quarters in the upper floors of the office building for the manager and an assistant; and in a house (18) on the east side of the works, close to the governor and valve house, are rooms for three foremen.

The works' water supply is obtained from wells (21 on plan); and provision is made for removing the contained iron. It was originally intended to draw the supply from the Tegel lake; but in the summer this water would have been too warm for the cooling purposes, for which the bulk of the supply is required. On the central section of the works are the shops (38 on plan), which

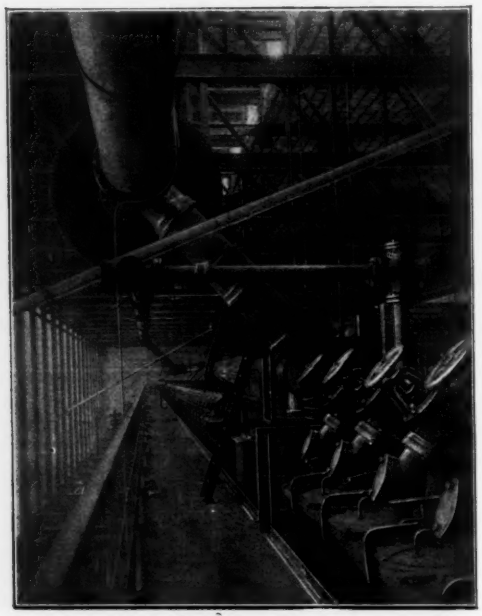

Fig. 5.—Gallery giving Access to the Hydraulic Main; with the Foul Main overhead.

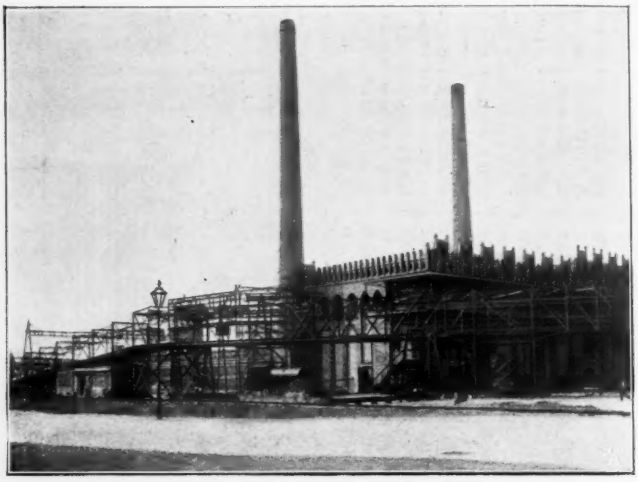

Fig. 6.—Suspension Line, Boiler House, and Electric Locomotive.

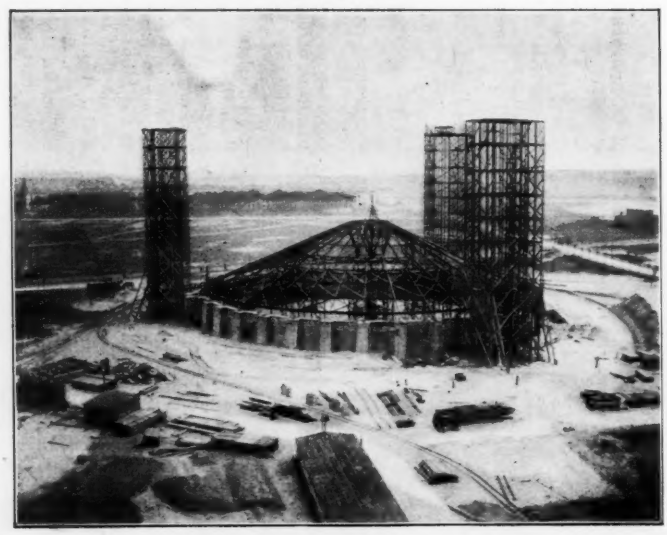

Fig. 7.—Gasholder in Course of Erection (May, 1903).

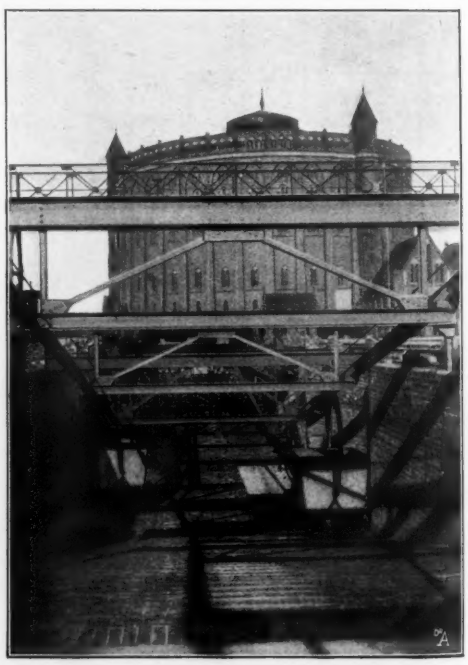

Fig. 8.—Gasholder, and Suspension Line in Front of the Coal Tip.

comprise a smithy with eight hearths, turning shop, fitters', carpenters' and tool shops, a store, and a pug-mill. The equipment is intended to admit of the prompt carrying out of all pressing repairs of moderate size. The land not yet built upon has been sown with grass.

The transporting arrangements of the works have ultimately to be adapted for dealing with about 700,000 tons of coal and 300,000 tons of coke per annum, and the necessary or corresponding quantities of tar, purifying material, fire-bricks, &c., ferrous sulphate, naphthalene washing oil, constructional materials, &c. There are three systems for the conveyance of all these materials—viz., standard gauge railway tracks, a narrow-gauge railway, and a rope-driven suspension line. The standard gauge railway runs from the Tegel Station through the middle of the works, and while at first carried only to the western boundary of the middle section, it is to be continued to the harbour. The narrow-gauge railway laid on the works' roadways is for the transport of structural materials, stores, and pipes, and establishes communication between all the works' buildings and the repairing shops. Cranes are provided for lifting heavy plant on to the trucks. The suspension line is intended primarily for conveying coal and coke, and is rope-driven.

The coal is removed from the vessels in the harbour by means of grabs from cranes travelling on rails on the unloading stage alongside the quay. The grabs are self-acting, and will hold 2 to 3 tons of coal. The power required for moving the travelling cranes is about 15 H.P., and about 150 H.P. for raising the grabs. Only one man is needed to work each crane. The grabs discharge the coal into a hopper, from which the waggons suspended from the line are filled through two openings. A hand-worked

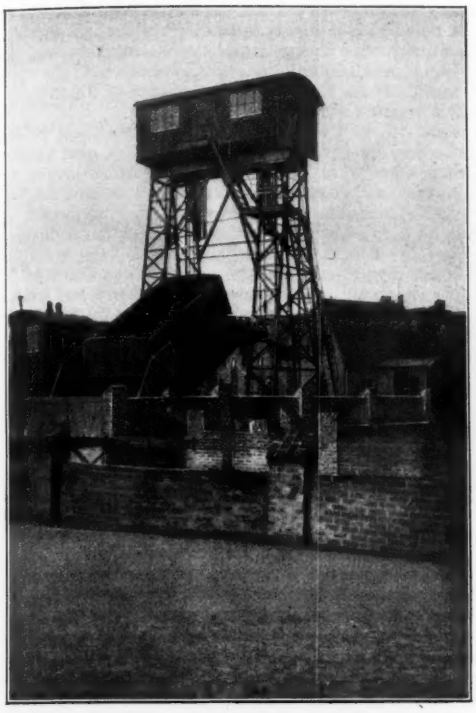

Fig. 9.—Waggon Tip.

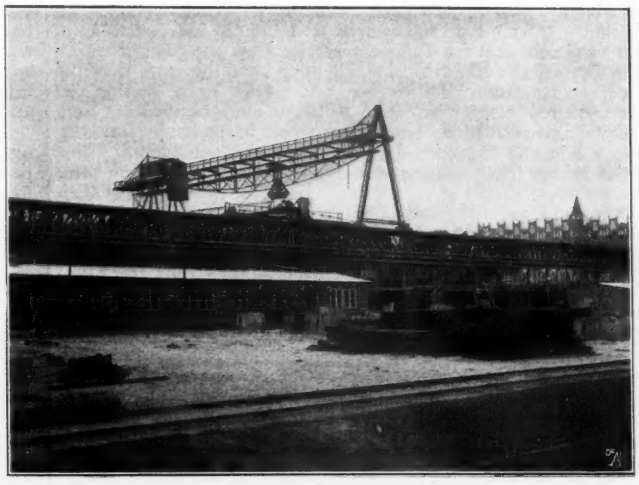

Fig. 10.—Grab Crane for the Coke Yard, with Suspension Line.

suspension line is provided as a reserve in case of a breakdown of the discharging cranes, &c. The waggons, as they pass to the suspension line encircling the coal-store, traverse an automatic weighing-machine, which registers the weights; and they then go on to the lines which pass through the store, where they are discharged, by tipping, by means of automatic switches at any desired spot. Or the coal can be conveyed and discharged directly into the coal-breakers. The coal is removed from the store to the breakers by means of suspension lines disposed below the openings in the bottom of the store. The lines crossing the store are worked by hand, but the longitudinal lines mechanically. For conveying the broken coal to the retort-houses, there are provided double-track suspension lines traversing the full length of the retort-house. The waggons discharge into overhead receivers, from which the coal is drawn for charging the retorts. Coal arriving by rail is first weighed, and the waggons are then discharged by means of the tipping apparatus shown in fig. 9 into a receiving hopper, from which the coal is drawn into the waggons on the suspension line system. The tipping apparatus can discharge and return about ten waggons, of 10 to 15 tons capacity, per hour. Waggons which open only at the side are emptied by hand in front of the tip and into the waggons of the suspension line.

The coke discharged from the inclined retorts falls against a travelling screen, which directs it into the De Brouwer conveying trough, which is irrigated so that the coke is quenched. The endless chain conveys the coke to an elevator, which raises it into a receiver, from which waggons on the mechanically operated suspension line are filled. The waggons are discharged by automatic switches just like the coal-waggons. The suspension line traversing the coke yard is shown in fig. 10. The grab crane is also seen in this view. The coke is picked up from the yard by means of automatic grab cranes and taken to the sorting plant, whence it may be conveyed to the harbour for shipment, or to the loading place. All the conveyors, elevators, and railways are operated by electric power. The current is continuous at 440 volts, and is obtained from two 400 H.P. gas-engines fed with gas from suction producers using coke. The buildings are heated by high or low pressure or exhaust steam, or, in some cases, by hot water, supplied from breeze or coke fed furnaces.

Lobbies and bath-rooms are arranged adjoining the retort-house, so that the stokers pass into them without traversing the open, and also in a convenient position for the purifier and scrubber attendants. For the yard men and others working in the open, accommodation is provided near the entrance hall and offices on the Berlinerstrasse.

The mechanical details of the coal and coke conveying and handling plant have been passed over lightly in this article, because a full description of it has already been given in the "Journal" (Vol. XCVIII. p. 296) by Herr G. Dieterich, the Engineer-in-Chief to the firm of Messrs. Adolf Bleichert and Co., of Leipzig, by whom this portion of the equipment of the Tegel works was supplied. That description, with its eleven illustrations of the conveying plant, should be read in conjunction with the foregoing general account of the works by those who wish to know what there is to be seen at the large and unique new works of the Berlin Municipality on the occasion of the forthcoming visit thereto of English gas engineers.

ELECTRICITY SUPPLY MEMORANDA.

Why the Administrative Company Withdrew—Metallic Filament Lamps and Street Lighting Prices—Competition with the Arc Lamp—Small v. Large Sources of Illumination—Charges to Private Consumers, and their Choice of Lamps—The Competition for Public Institutions.

Why the Administrative County of London and District Electricity Supply Company suddenly stopped promoting Bills for empowering the supply of electricity to the London undertakings in bulk and to the manufacturer pining for electricity for power purposes, has hitherto been invested with a little mystery; but we have the truth now. To-day, the electricity suppliers in London are blessing the defunct Administrative Company and its still animate Chairman, Mr. James Falconer. Who would ever have thought to see this gentleman on the side of the existing suppliers, who were at one time—so it was sworn before Hybrid Committees—suffering from senility and the possession of obsolete plant. Apparently there has been rejuvenescence, and in some miraculous way plant has become all right again. This has all happened in the few months since the Administrative Company were in succeeding sessions in Parliament. The Administrative Company's attack on London began in 1905. Then the charge for electricity for power was about 2d. per unit; and the promoters of the Company considered they could supply at ¾d. per unit. The plant of the existing suppliers was characterized then as not being up to date; and they were charged with not having developed the power business. But already the present suppliers—whether commercially justified or not—are supplying large and small power consumers at 1d. per unit, and agreements for seven years have been entered into with the best of the customers. Therefore, says Mr. James Falconer, it would be impossible to maintain an effective competition with the existing supplies; and so there is no room for a power company on an independent basis. A benediction on the head of the old enemy has no doubt been pronounced by every one mixed up with the administration of electricity supply in London; for his evidence the other day before the Lords Committee considering the London Electricity Bills was as effective as any in showing that an independent company has no chance now of financial success in London for bulk and power supply, and that London would suffer from the introduction of an additional amount of capital, which could not be lucratively employed, and would at the same time depreciate that already sunk in electricity supply. What a blessing for the promoters of the Administrative Company that something always turned up to prevent them receiving from the hands of Parliament those powers that would have committed them to a scheme that Mr. Falconer now shows would have been a financial failure. Well, well! things do sometimes happen for the best.

Some time since we were writing upon what were obviously close-cropped bids to get hold of the side-street lighting now that metallic filament lamps are available. Some of the estimates put forward by municipal electric lighting committees to draw the public lighting business from the local gas companies were easily distinguished as being merely bait offers with electricity at a price per unit that can never pay the Electricity Department. We are hearing less of these offers now; and it is suspected that they are not working out quite as was expected. Of course, it is bad enough to lose revenue through the private use of metallic filament lamps; but when it comes to losing as well on the street lighting for the sake of the empty honour of seeing electricity doing service for the public, it is a bit more than an electrician, with all his propensity for speculation, can long stand. A paragraph informs us that the Yorkshire Electric Power Company have offered to "do" the public lighting of Mirfield at £1 7s. 3½d.

per lamp. What "do" there means we have not a ghost of a notion. At such a price, however, we should be inclined to be a bit suspicious that the Company were in some way going to "do" the Council as well as the public lighting; and therefore it would be more satisfactory if there was information as to whether the price offered includes provision of lamps and maintenance, and labour, and what is the illuminating power of the lamps, and how many hours it is proposed to use the lamps per annum. The price for electricity is thin, whatever test is applied to it to estimate the value that it represents. The Gas Company's offer is £1 19s. 11d. per flat-flame lamp or £2 1s. 3d. per incandescent gas-lamp. It is rather late in the day to be offering flat-flame lighting; its very existence being a temptation to turn from gas to electricity. However, the Council are hesitating over the Electric Company's offer, as it involves a not inconsiderable expenditure on cables and so forth.

While on this street lighting question, it may be remembered that, in the recent paper by Mr. Hirst before the Institution of Electrical Engineers, mention was made of the longevity of the Osram lamp in street lighting at Canterbury. The figures were of a kind that no one else had reached. It transpires that the lamps are of the 32-candle 115-volt type, and that they are run two in series on 220-volt circuits, which means that they are being slightly underrun. Another matter that is engaging attention is the use of metallic filament lamps in place of electric arc lamps; and it looks as though the arc lamp will in future have difficulty opposed to its progress even from within its own family circle. It is pointed out that while something may be lost in using metallic filaments in place of arc lamps in respect of efficiency from the nominal candle power and wattage point of view, that there would be a big saving in the cost of carbons and labour. But what is this bringing us to?—to the recognition by electricians of a principle in street lighting that the gas industry long since contended was the correct one. That is to say, smaller light units than arc lamps at shorter intervals, so as to obtain the best uniformity in illumination along a street surface, instead of such a large difference as is found between the maximum and minimum illumination in arc lamp lighting. Of course, in times past the electricians ridiculed, and tried the *argumentum ad absurdum* method of confounding their gas opponents, by asking whether it was not a logical inference that if light sources smaller than electric arc lamps were better for uniformity, then rushlights at very frequent intervals would be better than incandescent gas-burners. Circumstances alter cases. The metallic filament was not at the time in existence; it has since come, and is accompanied by the idea that lamps at more frequent intervals could well disestablish arc lamps with their heavy expenses for introduction and maintenance, and their (having regard to the illuminating power when photometrically registered at short range) low diffusive power.

The increased efficiency of the metallic filament lamp must have a prejudicial effect on the revenues of electric light undertakings, owing to the reduced receipts from consumers using them, and owing to the reduced profit on the capital expenditure requisite for the supply of new consumers. There has been talk as to whether electricity undertakings could not compel consumers using the more economical lamps to pay a higher price for their current than consumers who still cling to the old carbon filament lamps. The idea, of course, is idiotic; but it was seriously put forward in certain places. The idea of penalizing people for practising economy is one that, if applied to life's doings generally, would ——well let's pass the point, with gratitude that those who propose it on this occasion are not rulers omnipotent. But there it is; and the proposal having been made, the "Legal Contributor" of the "Electrical Review" sets himself gravely to see whether or not this discrimination of charge to consumers using electricity for lighting would not be *ultra vires*, in view of the fact that the only ground for discrimination is merely one of the type of lamp used. The question as to whether it is politic to raise the price of electricity in view of the competition of inverted incandescent gas-lamps giving 20 to 25 candles per cubic foot of gas per hour, does not come within the scope of the "Legal Contributor's" discussion. But his argument, from the legal point of view, is worth reading, though inconclusive. He finds it unnecessary to travel outside the General Electric Light Act of 1882 for his points. He shows that electricity suppliers are not entitled to insist on the use of any particular kind of lamp; nor have they any right to interfere with the manner in which electricity is used, provided the manner of use does not affect the general supply. Therefore the suppliers have no right to decree that metallic filament lamps shall or shall not be used. Section 19 of the Act is the one on which our legal mentor is a bit wobbly. It entitles any company or person to a supply of electricity on the terms on which any other company or person is entitled, "under similar circumstances, to a corresponding supply." The important words are "under similar circumstances." Is the distinction between an economical and an uneconomical lamp in respect of its electricity consuming capacity a dissimilar circumstance warranting a difference in charge? It is really too absurd to think of; but the legal contributor has some lurking doubt, as he says that, "having regard to the enormous interests at stake, it would be of great interest to see what the Courts would have to say upon the construction which we venture to think might be put upon the section. One must not, however, lose sight of the other part of the section which says that the suppliers must not interfere with the manner in which electricity supplied by them under the Act is used." But where is there a supply authority who would care to go into Court to contest such a point? If a supply authority are foolish enough to make such a differential charge under such circumstances, there is no knowing to what extent their foolishness would go even in litigation; and there ought to be some protection of the ratepayers and the public against such folly.

There seems to be a sort of mutual understanding between authorities having the government of local affairs, that as far as possible, when there is any choice between patronizing a company and a local authority, no matter what happens, the latter shall have preference, and the interests of the ratepayers may be regarded as a negative quantity in the consideration of the matter. The City Board of Guardians have a new workhouse and infirmary at Homerton; and the architect has obtained from the Electrical Engineer to the Borough of Hackney and from the Gaslight and Coke Company some particulars as to the schemes they would propose for lighting the building. The costs work out as follows:—

	Electricity.	Gas.
Initial cost	£1000 0 0	£289 7 9
Annual cost of illumination	150 0 0	283 16 8
Annual cost of maintenance	60 0 0	82 15 0
Total of two last items	£210 0 0	£366 11 8

Of course, these figures look bad for gas, until their true meaning is explained. In the first place, it will be noticed that the initial cost of the gas scheme is only a little more than one-quarter that of electricity; and in giving "the total of the two last items," no account whatever is taken of repayment and interest on the cost of the two installations, which for gas would be little more than one-fourth the amount required for the electricity scheme. This alone would make a considerable difference in what purports, as the above figures stand, to be the total annual charge. Then it is admitted that the total candle power given for the gas scheme is *more than double* that of the electricity scheme; so that, if the same illumination had been proposed for electricity as for gas, the total of the annual cost of the illumination and maintenance, and the sinking fund and interest charges, would have been considerably more than for gas. There is evidence that the electricity scheme is one in which illumination is to be starved for the purpose of giving at the outset an excuse, through cost, for the adoption of electricity. Will the low cost continue? Will the low illuminating power long suffice? The architect told the Board that one 8-candle power electric lamp would be used in positions only requiring a small light; whereas, in those positions, it was proposed to use a gas-lamp giving 60-candle power. Gas is not fixed at 60-candle power light sources. A 25-candle power inverted gas-lamp could be put in such positions, giving the benefit of three times the illumination, and only consuming about 1 cubic foot of gas an hour. It is questionable, too, whether in the estimate the same number of lighting hours has been calculated for electricity as for gas. We should like to see comparative estimates of gas and electricity, showing the amount at which, including all charges, the Hackney Electricity Department would be prepared to guarantee the same illumination for the same number of hours as offered by the Gaslight and Coke Company, and the amount at which the Gas Company would be willing to give an illumination equal to that proposed as adequate by the Hackney electricity people, and for the same number of hours. But the City Guardians manifestly have no desire to get at the bottom of things in this matter; for, by a small majority—we think of only two—they have decided in favour of electricity. Do they not remember Hammersmith? We do not think the Gaslight and Coke Company will let such a comparison as this pass without challenging it, and so ascertaining whether the bases of calculation are the same.

Next Year's City and Guilds Examinations.

We have received from the Superintendent of the Department of Technology of the City and Guilds of London Institute (Sir Philip Magnus, M.P.) the programme for the ensuing session, containing the regulations for the examination of candidates in technological subjects. As our readers are aware, examinations are now held on the two subjects of "Gas Engineering," including manufacture, and "Gas Supply," including distribution and the applications of gas; and intending candidates will find on pp. 51-6 an indication of the nature of the questions which will be set by the Examiners (Mr. W. Doig Gibb and Mr. J. H. Brearley) in the Honours and Ordinary grades, and lists of the books that they are recommended to consult. The examinations will be held on the 24th of April and the 1st of May. The first prize in the Honours grade is £3, given by the Goldsmiths' Company, and the Institute's silver medal; the first and second prizes in the Ordinary grade being £2 10s. and £1 10s. given by the Company (in each case accompanied by the Institute's bronze medal); and the third a bronze medal. The examinations in "Coal-Tar Distillation and Coal-Tar Products," particulars in regard to which will be found on pp. 41-4, will be held on the 29th of April; the Examiners being Professor A. G. Green and Dr. J. C. Cain. In the Honours grade, the first prize is £2, given by the Salters' Company, and the Institute's silver medal; the first and second prizes in the Ordinary grade being £1 10s. and £1 (with the Institute's bronze medals); and the third a bronze medal. The programme is published by Mr. John Murray, Albemarle Street, at the price of 9d. net.

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Zürich	100	Berlin—Mariendorf	84
Düsseldorf	70	Berlin—Tegel	10

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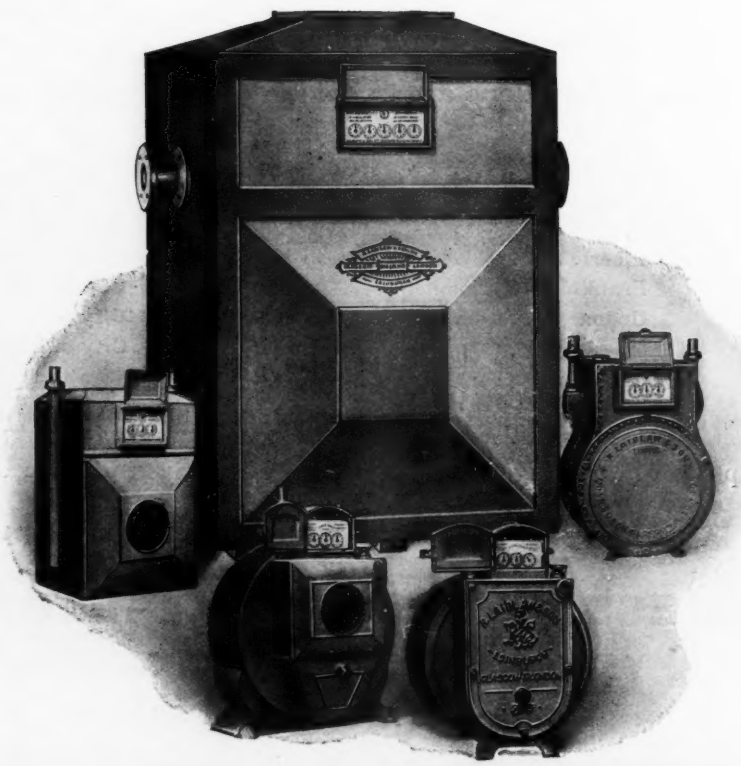

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Further Notes on the Gas Section.

DURING the Whitsun Holidays, the Machinery Halls were visited by a large number of people, who streamed past the then completed suite of rooms of the Gas Section Committee, and were greatly attracted by all that was to be seen there. The crowd, the heat, the dust, and the moving machinery suggest that the location of the exhibit is not altogether the best, if there had been any option in the matter, that could have been chosen for it; and we are not convinced that the building itself is of the best possible design for the purpose to which it is devoted. The roof is low-pitched, and glazed; and the heat is, when the sun's rays beat powerfully down on the building, intense and almost unbearable for those who are in attendance on the exhibits. The unconsolidated footpaths outside were practically, at the beginning of last week, a continuous bed of dust; and the slightest wind caused it to swirl up. The crowds visiting the hall during the holidays brought dust in with them—the air, in fact, was full of dust, and the moving machinery helped to carry it through the place. Those looking after the suite of rooms, it was noticed, were kept fairly busy in maintaining their picturesque charge in presentable appearance. The Exhibition authorities could do much to ameliorate the inconveniences of heat and dust by proper ventilation, by screening the exhibitors from the direct heat of the sun, and by putting and keeping the outside paths in proper order.

With this little grumble, we will turn to the suite of rooms. Since our last notice they have been completed; and the rooms are undoubtedly very popular. There is nothing like animation in securing public attention and a popular verdict. Crowds actually stop up the pathways to watch the laundresses at work in the laundry fitted throughout with gas-operated machinery and gas-heated irons, the gas being supplied at high-pressure by means of a Keith compressor. Real work is being done in this laundry; there is no make-believe about it; and the laundresses are all skilled workers from Messrs. H. W. & D. Emmins, of the Northcote Laundry, Willesden. Then from time to time the "Welte-Mignon" of Messrs. Steinway and Sons in the dining-room is set to work; and the merry music affords an alternative attraction. At other times the billiard room is the scene of play; and crowds again congregate. These are among the attractions; and inquiry as to whether they are successful in drawing attention to the gas exhibits brings an emphatic affirmative answer from Mr. E. Pilbrow, of the Chief Inspector's Department of the Gaslight and Coke Company, who has (with the aid of assistants) taken charge on behalf of the Gas Section Committee. The points upon which information is sought, it appears, are legion; and no one but men with a large experience in the most modern applications of gas would be of any use at this suite of rooms. Fittings, burners, the automatic means of lighting and extinguishing, the heating arrangements, the cooking range, the kitchen fittings (Miss Sanderson, of Coleshill, will be giving some cookery demonstrations here soon), the gas methods of heating and circulating water, and the laundry fittings bring in the day their thousand and one questions.

We have already described the furnishing of the rooms by Messrs. John Barker and Co., Limited; and then generally explained how the rooms were being fitted up (see "JOURNAL" for May 19 and subsequent issues). But we may now again run through the rooms, to deal a little more particularly with the gas arrangements. In the lighting, the inverted incandescent gas-burner takes most prominent part; but the vertical burner has by no means been neglected. There is no doubt of this, however, that the inverted burner is demonstrably the means of lighting for the reception or best rooms of a house, and for rooms where a downward light is required for work, writing, or reading. An exceptionally pleasing feature is the great interest evinced by visitors in the automatic lighting and extinguishing arrangements with which the rooms are furnished.

ENTRANCE HALL AND CORRIDOR.—In the comfortably and prettily furnished entrance hall and corridor, there is one of Wright's "King" fires, in silver and brass, with trivet burner. A variety of means of lighting is displayed; and it is observed here and in other apartments that oxidized silver fittings and dull gilt fittings lead in fashion to-day. An oxidized silver hall lamp in the hall, by Messengers, attracts notice; and the brackets (most of them specially designed) by Jesson Birkett, Evered, Ingram and Kemp, and Best and Lloyd, are very pleasing in character, as are also the pendants by Benson.

BILLIARD-ROOM.—Passing into the billiard room, its heating is provided for by a Cannon "Sefton" fire in black; and in regard to the lighting, over the billiard table is a handsome two-light billiard pendant in oxidized silver, with A.V.I.L. burners and fittings. This was specially designed, and made by Best and Lloyd. Round the oak-panelled walls are, by the same makers, brackets in oxidized silver, and specially designed shades by Ellis and Saunders. The "Norwich" switch, by Hands, is used in this room, together with New Inverted Company's burners.

BOUDOIR.—In this elegant apartment, the fittings are of the most dainty. For heating, it is remarked that a Tilley "Hot-Ray" burner fire has been fitted in a Carron interior. For the lighting, there is a beautiful four-light imitation candle pendant, Louis design, by Best and Lloyd; and there are also imitation candle brackets to match, fitted with the pneumatic switch.

DINING-ROOM.—The heating here is by one of Davis's "Diamond" fires, in armour bright. The central fitting for lighting is an exquisitely designed two-light oxidized silver shade pendant, with cardinal red shade, fitted with Bray "C" burners. The character of the brackets is in keeping with the central fitting. They are furnished with New Inverted Company's burners, and pneumatic switch. Ellis and Saunders are the makers of the shades.

KITCHEN.—The kitchen has now been divided from the dining-room, and so there has been removed what, without explanation, was somewhat of an incongruity. To catalogue all that is to be seen in the kitchen by means of which gas is brought into use would make a fairly formidable list. We note a Davis double-oven cooker, with plate rack; enamelled boiling-burners, by Fletcher-Russell; a three-tier domestic steamer and carving-table with overhead gear, by Richmond; a "Jubilee" griller, by Main; a "Uno" coffee roaster, a quick cooker, &c. Water heating by gas is fully demonstrated. One of Wilsons and Mathieson's water-circulators (No. 2) is fitted up, as well as a Ruud water-heater, and a Davev and Roberts coke-boiler. The lighting is by one of J. & W. B. Smith's three-light "Silva" inside lamps, and double-swing brackets, fitted with Bray incandescent burners and pneumatic switch.

SCULLERY.—Fixed in this necessary adjunct to the kitchen are an automatic "Sun" boiler, of 20 gallons capacity, by Wright, and a "Blackpool" wash-house boiler, by Richmond. Whitehouse gas-brackets, fitted with Bray incandescent burners, have been fixed for the lighting.

LAUNDRY.—Then there is the popular laundry. All high-pressure gas is employed here; an independent Keith compressor being used for the purpose of raising the pressure. Gas-engine, washers, wringers, and drying-machines, as well as the irons, are worked or heated (as the case may be) by gas.

NURSERY.—The heating of the nursery is by a "Health" fire of Parkinson and Cowan's make. Whitehouse polished brass brackets of modern design, with suitable fancy shades by Ellis and Saunders, and vertical incandescent burners by Bray, are the means for lighting.

SECOND BEDROOM.—The heating of this room is by a "Sheraton" fire, with boiling-burner, by Wilsons and Mathiesons. For the lighting, a dull gilt "Surprise" pendant by Best and Lloyd, is a central feature; and it is supplemented by brackets to match, fitted with imitation candle and bijou inverted burners. The shades harmonize well with the general appointments of the room.

BATH ROOM.—Never was bath room better fitted with all that is necessary for comfort and convenience. Here for heating is a Davis "Diamond" fire, with boiling-burner; as well as one of Clark's enamelled majolica condensing-stoves. A Ewart "Lightning" geyser is fitted up; and there is also a combination iron and shaving-water bracket, fitted with the pneumatic switch. Whitehouse nickel silver brackets have been adopted for the lighting.

LARGE BEDROOM.—Next to the bathroom is the large or best bed-room. The heating arrangements are one of Wilsons and Mathieson's "Marlborough" fires (with duplex burner), very prettily decorated in white and gold, and Carron "Louis" dog grate, fitted with an Edgar "Blenheim" duplex fire. We like the dull gilt fittings for lighting that are found here and in other rooms. A specially designed central drop "Surprise" pendant, by Best and Lloyd, is the principal fitting, and harmonizing in design are the imitation candle and bijou inverted burner brackets. Ellis and Saunders are the makers of the delicate and artistic shades used.

LIBRARY.—An "India" fret fire in majolica, by Fletcher-Russell, is used for heating this apartment; and for lighting, there are all the fittings requisite for use to serve convenience and comfort, according to occupation. There is a dull gilt "Surprise" bracket and shade, by Best and Lloyd; and other gilt bracket fittings, in Dutch style, by Bensons. A floor lamp (in dull gilt, by Messenger) is seen to be very useful in the equipment of a library, as is also a revolving table lamp, for bijou burners, by Ingram and Kemp. The shades are quite in harmony with the surroundings.

DRAWING-ROOM.—This is the room of rooms for delicate and charmingly artistic work. We are not altogether favourably disposed to log fires; but for heating, one by Richmond, with brass rests and dogs, has been installed here. In the lighting of the room, there is a floor lamp, of Messenger's "Louis" pattern, with table in onyx; and another floor lamp, in Adam style, of Best and Lloyd's make. A very chaste design of table lamp by the latter makers arrests the eye for its beauty; and the same firm's Adam brackets, with Wedgwood plaques, should claim the notice of those in search of artistic merit in fitting design. A kettle gas-stand, by the Gaslight and Coke Company, completes the gas-fittings of the room.

On the dividing columns of the walls of the suite of rooms, Evered brackets of special design, in silver and hammered iron, and fitted with Bland inverted burners, both large and small, add at night time to the brilliance of the scene. We have before remarked upon the fact that the top of the stand is lined out with bucket lamps (coloured globes), and on each side is one of Keith's 1500-candle power high-pressure lamps, challenging for brilliance, steadiness, and cheapness the neighbouring flame arc electric lamps.

Taking the apartments as a whole, there is not one dull spot

SERVANTS prefer situations in households where the dirty work is reduced to a minimum.

In these days when servants are hard to get and to keep, that is a sound argument in favour of using gas in place of coal for cooking, heating, and hot water supply.

When you happen to be without a servant in the winter, the argument needs no underlining—it emphasizes itself.

COMFORT IN THE BEDROOM.

WHO that has not got a gas-fire in the bedroom can have the comfort of a fire to dress by in the morning; a fire to dress by in the evening; a fire to undress by at night, except at an expenditure of time, temper, labour, and fuel, accompanied by an amount of dirt and inconvenience that not one person in a thousand could afford or would endure.

A London Physician says: Everyone who is in any way delicate, especially on the chest, should have a gas-fire in the bedroom.

GAS-FIRES are invaluable as a preventative of chills, and are a wonderful comfort and convenience in this fickle climate of ours. You can have a hot fire any time of the day of the year, without any dust, work, or trouble. It does not matter if the house has been spring-cleaned.

Gas-fires make no work for housemaids, chimney sweeps, or curtain cleaners.

A COOK-GENERAL can do the work of two servants if gas is used instead of coal for cooking and heating.

A gas cooker cooks the dinner without cooking the cook.

WHEN husbands unexpectedly ask their friends to come and take "pot luck," the ever-ready gas cooker proves its value. It has no moods like a coal range. It is always "just right" whatever you want it to do, and does it quickly.

RELATIVE COST OF GAS LIGHT, TAKING THE PRICE AT 3S. PER 1000 CUBIC FEET, AND ELECTRIC LIGHT, TAKING THE PRICE AT 4D. PER UNIT.

Cost including Renewal of Mantles and Electric Lamps of 500-candle power for 1500 hours.

Incandescent Gas-Burners. . .	£7
Osram Electric Lamps	£21
Electric 16 c.p. Glow Lamps . .	£55

Money saved is money earned.

GAS-FIRES AS AIDS TO HEALTH.

A LONDON Physician says: Everyone who is any way delicate, especially on the chest, should have a gas-fire in the bed-room.

A bright hot fire at a moment's notice, any hour of the day or night, making no dirt or work, will save many a doctor's bill, and can be obtained at the cost of a very moderate gas bill.

And the comfort of it on cold mornings!

THE MORNING TUB.

MANY persons prefer, or are ordered by their doctors, to take a hot bath first, followed by a cold shower or sponge-down. The combination is most refreshing and health-giving. But in how many households can a hot bath be relied upon in the morning? In very few in which the hot-water supply depends on the kitchen fire. But every house or flat can have a constant and reliable supply of hot water, without the aid of the kitchener, by means of a gas-heated circulator, which can be connected to the existing pipes, and used independently of the kitchen range, or by the use of a geyser.

THE heat required for hardening and shaping incandescent mantles is obtained by gas under pressure from a Keith Compressor driven by a National Gas-Engine, which proves the cheapest, cleanest, most convenient, and most reliable fuel for all industrial purposes.

HOT water night and day without the use of a kitchen range.

IN houses or flats where gas-fires and gas-cookers are used it has been found that one servant can do the work of two, who would be required if coal were used, and that laundry and cleaners' bills are reduced. Carpets, curtains, tapestry, blinds, and wall papers last longer; while the comfort and convenience of the household are greatly enhanced. Therefore, by using gas for cooking and heating, you can reduce housekeeping expenses, and increase home comforts.

THE Mistress is less dependent on her servants who has equipped her house with a gas-cooker, a gas-heated hot-water circulator, and gas-fires.

Moreover, she can in many cases thereby dispense with one servant altogether. That saves at least £50 a year, which will pay for a lot of gas, and there will be no coal bill to pay.

EXACT and instant regulation of heat, and the constant maintenance of the desired temperature for roasting, boiling, frying, grilling, or simmering are ensured where a gas-stove is used, but can never be relied upon with a coal range.

Gas-stoves save time, labour, and temper.

THE most of the best for the least is what everyone wants. Every good business man wants the most of the best light for the least money, because he knows that good lighting always means good business. Customers are attracted by, and like to make their purchases in, a shop illuminated by a bright, well-diffused, and steady light. Workmen can turn out better work, and more of it, in an efficiently lighted factory.

In lighting, the most of the best for the least can only be obtained by using incandescent gas-burners.

about them. They show that rooms in any style can be excellently lighted by modern gas methods; that gas lighting has been adapted to the fullest range of requirement by the elasticity in design that the incandescent mantle has so liberally allowed; that there is not, in domestic lighting, a single convenience possessed by the electric light that is not also possessed by gas; that in artistic merit, and as an agent in any scheme of house decoration, the gas-fitting is not surpassed by the competing electric fitting. The high class gas work that is being exhibited in these rooms we fancy must have come as a revelation to those among electricians whose associations with gas have not, according to their admissions, extended beyond the crude designs of a past day.

FRAMED ANNOUNCEMENTS.

In looking round the apartments, a number of framed announcements meet the eye. They are very much to the point, and are, in fact, just of that *multum in parvo* kind that such announcements should be. They have attracted much attention from gas managers who have visited the rooms, and who are on the look-out for originality for advertising purposes. We believe the credit for their drafting should be awarded to Mr. F. W. Goodenough, the Chief Inspector of the Gaslight and Coke Company. This acknowledgment should be made in taking copies of the useful announcements for publication. It should also be mentioned that each announcement is displayed in large and small type in an effective manner, so that the words that it is desired should impress immediately catch the eye.

INDUSTRIAL SECTION.

The Industrial Section is still incomplete, but interest in it has been growing day by day. We rather fancy the Gas Section Committee must be a bit disappointed that this side of the display has not developed better. There is the "shop," with the gas-engines at work coupled up to the Keith gas-compressing plant or to dynamos for the generation of electricity. In the next apartment, girls are at work on incandescent mantle making. The mantles they are moulding and burning off here are of all sizes, and are being made for use by the Gaslight and Coke Company in the West-end. The plant and staff are equal to about 8000 mantles a day. In the next apartment, tinmen are now at work making meter parts; and complete meters in glass cases are shown. The next apartment has been fitted with a shop front, and will have in the windows samples of the vast range of bye-products of gas manufacture. It will also enable shop lighting to be demonstrated. We have not yet been informed as to the decision of the Gas Section Committee regarding the last apartment, in which it was originally hoped to demonstrate glass work by the use of gas-heated furnaces.

THE LONDON ELECTRICITY COMPANIES' EXHIBIT.

The exhibit that the London Electricity Companies are jointly making, and which adjoins the Gas Section Committee's display, was not in a finished state for the great mass of visitors to the exhibition last week. Warings had completed their work in furnishing the rooms. The idea is that the enclosed rooms represent a bungalow; and they are furnished in the firm's £200 style. As demonstration of how to prettily furnish a bungalow, it is perfection; and the house of Waring is to be congratulated upon its ingenuity in getting such an excellent advertisement. But the lighting during the holidays (there may have been improvement since) appeared to be somewhat of a temporary nature—possibly it was merely a trial to ascertain by gradual steps the minimum lighting necessary for such rooms. The lighting was, at the time, ineffective; but a good stream of people passed through the rooms—and admired the furniture and decorations. They were certainly the great attraction; and once more we congratulate Warings. The lighting of the drawing-room, for instance, is by ceiling reflected light, with lamps masked from the eyes by the cornice. The room was very dim; the ceiling a study in small patches of bright light and considerable shade. We will not, however, criticize too much, as the arrangements may be but temporary; but, if so, why? There surely are lamps enough to be had to make a good job of the lighting straight off, instead of giving a false impression by a makeshift installation. In this £200 furnished bungalow, there is fitted an electric cooking apparatus that is, in appearance, a fearful and wonderful structure; and it must be so, for someone said that the selling price was about equal to the £200 worth of furniture in the rooms. Again there is no good being too positive on mere hearsay; but anyway it is rather inconsistent to put a piece of apparatus of the kind on show in a bungalow. There are several electric fans about the rooms. Doubtless they will be needed so as not to give visitors a bad impression of stuffiness; for the rooms are small, and the bungalow is built in the Machinery Hall! The reception and general exhibit room was not equipped early last week; but electric punkahs and such-like things will, it is understood, be used here, to show how nice things can be kept by means electrical. When the exhibit has been completed, and there has been improvement in the lighting upon what was seen early last week, it will be well worth a visit by gas people.

Messrs. George Bray and Co., Limited.

Notices have been given from time to time of the stands of the few manufacturers exhibiting in conjunction with the Gas Section Committee's exhibit. Two or three have still to be referred to here. One of them is the stand of Messrs. George Bray and Co., Limited, which was completed in time to attract the holiday people by the brilliance of its illumination. The stand is practically entirely devoted to the firm's well-known specialities for interior lighting—from the drawing-room throughout the house to factories and warehouses. Here are seen the adaptation to all fittings of the firm's reversible inverted burner; and a very pretty effect is obtained. Here, too, are seen anti-vibrating pendants for shops, factories, mills, or warehouses. The specialities have been described in our pages before. But just a note or two to remind readers of prominent features of certain of those now shown in use. There is the "Bray '07" reversible inverted burner which is adaptable to any style of gas bracket or pendant, old or new, without the aid of an adaptor. The globe is held in position by screws fixed in a patent spring globe holder, which obviates the breaking of globes by being too tightly screwed up. The burners are fitted with a patent gas-adjuster. There is a make of this burner which comes midway between the ordinary large size and the bijou form, and is therefore suitable for positions where more light is required than can be obtained from a single bijou burner, but where a full-sized inverted burner is unnecessary. The consumption of gas by this burner is, according to the quality of the gas, between 1½ and 2 cubic feet an hour. The Bray horizontal inverted burner is also seen. The bunsen tube is placed horizontally; and only the end towards the nozzle is curved downwards to take the mantle. The effects of this are obvious. The main parts of the burner and of the fitting carrying it are quite out of the path of the products of combustion; as are also the inlets for the primary air. This burner is fitted with the patent gas-regulator. We cannot mention all the admirable burners to be seen on the stand; but among the fittings special attention may be directed to the firm's new anti-vibrating gas-pendant which is made to carry either a vertical or inverted burner, according to the fancy of the user. The fitting ought to be a very popular one for slot installations. Visitors will not fail to find many interesting features in the practically designed fittings on view.

Visit of Cardiff Gas Employees.

No doubt many of the employees of gas undertakings have already been to the Exhibition; but the only organized excursion of which we have yet heard has been one from Cardiff. It took place last Saturday week, when quite a large party of the Cardiff Gas Company's workmen visited Shepherd's Bush; and from the reports given by the men, they were highly interested in all they saw, and especially in the exhibits relating to gas lighting. It is understood that the whole of the arrangements were made, on behalf of the Directors, by the Secretary of the Company (Mr. George Clarry). The Board dealt very generously with the men—bearing the expense of the train from Cardiff and home again, and giving each workman a free admission ticket to the Exhibition. These privileges were greatly appreciated by the men. There was not a hitch in the day's arrangements or enjoyment; and all the party returned from the Exhibition highly delighted with what they had seen. Indeed, some of them were talking of paying another visit when all the exhibits are complete.

Mr. Clarry suggests that it may be useful to mention, for the information of those who contemplate organizing visits to the Exhibition, that, on applying to Mr. Otto Hill, who has charge of the excursion arrangements, special rates are quoted according to the number of the party; but it is desirable that application for privileged tickets should be made well in advance.

During the Whitsun holidays, large bodies of workmen visited the Exhibition; and it was interesting to notice how those from the great industrial centres of the North made their way early to the Machinery Hall, lingered long there, and regarded it as the central feature of the show, eschewing the wonders of the lighter arts, looking upon them as paltry and beneath notice compared with the powerful machinery and other productions of the iron, steel, and coal industries.

Gas Engineering Staff of the Oldham Corporation.—At the last meeting of the Oldham Town Council, the minutes of the Gas Committee contained the following promotions: Mr. T. H. Nield to be Assistant-Manager at the Hollinwood station, and Mr. D. E. G. Griffiths and Mr. Herbert Wrigley to fill similar positions at the Higginshaw and Oldham stations. The minutes were confirmed.

Automatic Estimation of Carbon Dioxide.—At the last meeting of the London Section of the Society of Chemical Industry, Dr. C. A. Keane and Dr. H. Burrows described the "Autolysator," an apparatus lately devised by Strache, Johoda, and Genzkin for the automatic estimation of carbon dioxide in furnace gases, producer gas, and similar products. It differs from other forms of apparatus for automatic analysis in giving a continuous, instead of an intermittent, record of the carbon dioxide content of the gases examined. Results obtained on the laboratory scale with a gas-furnace showed that the records of the instrument agree, within 0·3 per cent., with those obtained by the ordinary analytical methods, and that it responds very efficiently to changes in the percentages of carbon dioxide present in the gas.

REMOVING CARBON MONOXIDE FROM COAL GAS.

In the "Journal" for the 2nd inst., reference was briefly made to a communication on the above subject to the Paris Academy of Sciences by M. Leo Vignon. The text of his communication has been given in the "Comptes Rendus," from which the following additional particulars have been obtained. It may be remembered that the author experimented with three methods for the removal of the impurity referred to—viz., its conversion into methane by means of reduced nickel, its transformation into carbon dioxide by heating with oxide of iron at definite temperatures, and its direct absorption with cuprous chloride.

Dealing first with the conversion of the carbon monoxide into methane, the author says the Sabatier and Senderens process of hydrogenation, which is based on the action of nickel at 250° C., enables this to be done completely. Coal gas, in fact, contains all the necessary elements for the accomplishment of the reaction $CO + 3H_2 = CH_4 + H_2O$. The gas must, however, be previously freed from benzene. The following is the percentage composition of a sample of coal gas before and after the action of nickel:—

	Before. (Volume 4250 c.c.).	After. (Volume 2900 c.c.).
Carbonic acid	2·00	—
Oxygen	1·00	0·20
Nitrogen	3·10	4·30
Hydrogen	46·50	25·90
Methane	37·70	69·40
Carbon monoxide	9·50	0·09
Not analyzed	0·20	0·11
	100·00	100·00

Application of the Sabatier and Senderens method makes it possible to mix a certain amount of water gas with coal gas before subjecting it to the action of the nickel. For example, take the following mixture:—

Coal gas	Hydrogen	50	= 100 volumes
	Methane	40	
	Carbon monoxide	10	
Water gas	Hydrogen	10	= 20 ,,
	Carbon monoxide	10	

This mixture will contain: H, 60 vols.; CH_4, 40 vols.; CO, 20 vols. After reaction of the nickel, we obtain 60 volumes of CH_4.

With reference to the second process, the author says that by passing the gas, previously freed from benzene, on to various oxides of iron, a greater or less amount of the carbon monoxide is transformed into carbonic acid, according to the temperature employed. The formation of carbonic acid is limited by the presence of hydrogen. There is at the same time a reduction of the volume of gas employed, owing to the formation of water. He obtained the following results with three different oxides of iron on gas containing before the reaction 9·86 per cent. of CO and 1·64 per cent. of CO_2:—

	Temperatures. Deg. C.	Reduction of Volume. Per Cent.	CO. Per Cent.	CO_2. Per Cent.
(1)	435–450	—	9·70	1·80
	800–900	12·5	8·15	3·55
	1100	15·2	7·90	3·50
(2)	900	28·2	2·10	9·90
	1100–1200	31·5	4·85	6·65
(3)	1000–1100	33·3	3·10	10·90

The carbonic acid formed is absorbed by the known methods.

Coming to the third method, the author points out that carbon monoxide can be absorbed at the ordinary temperature by contact with an aqueous hydrochloric solution or an ammoniacal copper-chloride solution. The following are the results obtained with acid copper chloride:—

	Percentage Composition of the Gas. Before Treatment.	After Treatment.
Carbonic acid	1·80 to 1·85	1·70 to 1·95
Carbon monoxide	10·10 ,, 10·15	0·90 ,, 1·10
Oxygen	0·60 ,, 0·65	0·50 ,, 0·60

Thus the three methods specified permit of the elimination or reduction of the proportion of carbon monoxide contained in the gas; and the author submits that, by this industrial application, existing inconveniences, so far as the public health is concerned, associated with the use of coal gas, could be to a very large extent removed.

The Albert Medal of the Royal Society of Arts for the present year has been awarded to Sir James Dewar, F.R.S.

It is reported by "Motor Finance" that: "Mr. Edmund Eaton, of various addresses, and promoter of various unpaying ventures, has not met with any success in his recent attempt by the Water and Gas Debenture Share and Investment Trust;" and it is added: "Although there may be a few who have subscribed for shares in ignorance of the facts, they would do well to make inquiries with reference to the constitution of the Company before paying up any calls."

ROUND THE WORLD—AND SOME GAS-WORKS.

By Maurice Graham.

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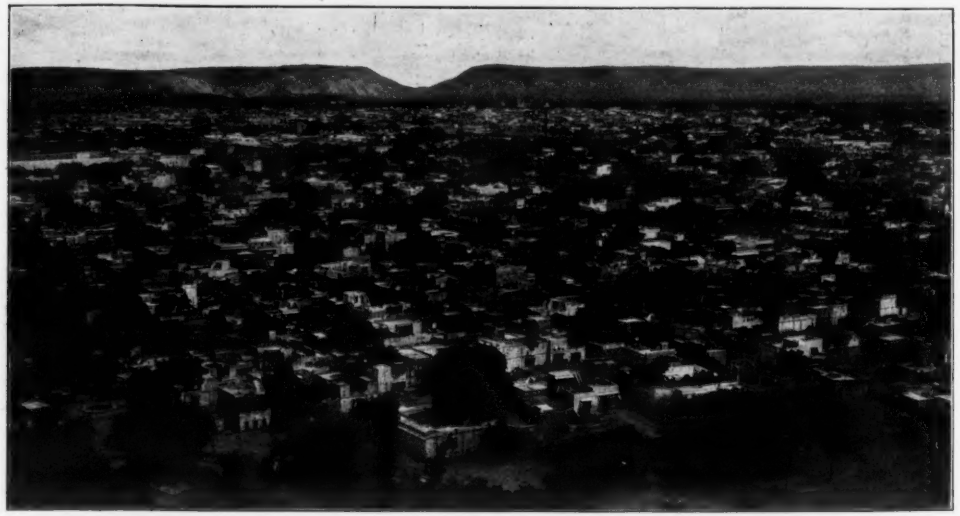
III.—ACROSS INDIA.

After leaving Bombay and travelling through the night, the train reached Abu Road Station in the afternoon of the following day. A rough style of two-wheeled conveyance, known as a tonga, with neither springs nor cushions, carries the traveller up the 18 miles of hill road, through cuttings, along precipices (reminding one of Switzerland), and through small tunnels to Mount Abu. The quaint villages passed make one realize that the traveller is at last in the East, unadulterated with European ideas.



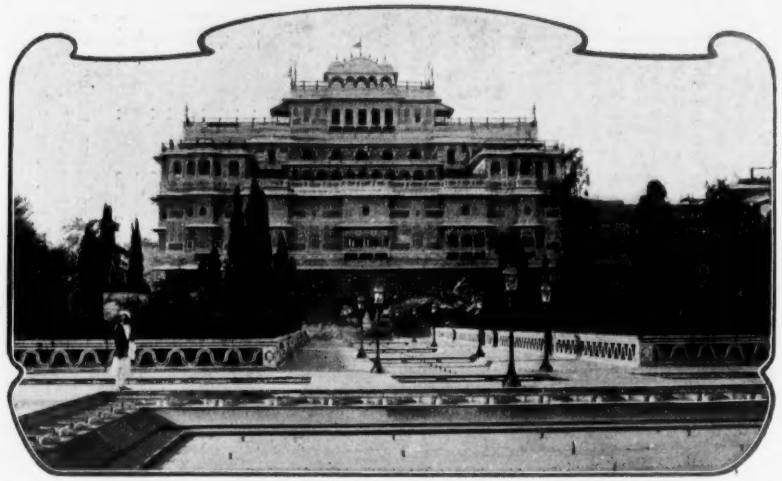
Photograph No. 24.—General View of Jaipur.

Mount Abu.

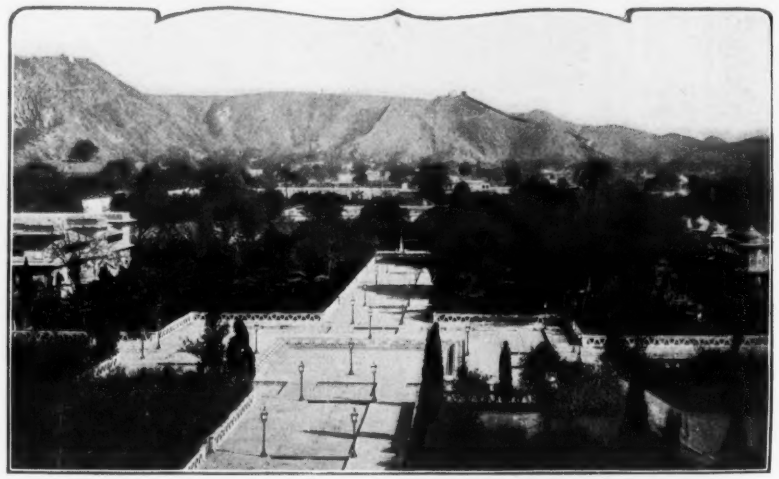
The whole of this district is lighted by oil-lamps, as the writer was informed that coal gas would be too costly for the purpose. The lamp-post was a familiar sight among the varied scenery. Another night's journey, as bitterly cold as the day was broiling hot, and Jaipur was reached.

Jaipur.

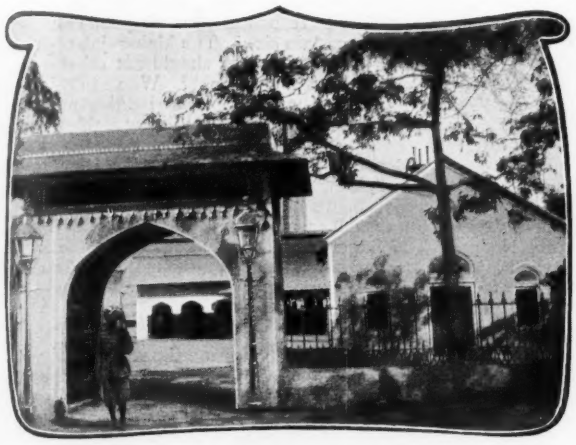
This town is the modern capital of Rajputana, and has a population of 160,000. A general view of it is given in Photograph No. 24. It contains the residence (see Photograph No. 25) of H. H. the Maharajah Sir Madho Singhji, G.C.S.I., G.C.I.E., G.C.V.O., who owns the gas-works, water-works, and runs everything as his own municipality. The first impression the writer had of the gas-works was not encouraging, as a soldier, with loaded rifle, guarded the entrance to them (Photograph No. 27). However, the smiling countenance of the visitor was sufficient to thaw the warrior's feelings; and an interview was obtained with the Engineer and Manager, Mr. John Dominy, who received him with every kindness. This gentleman comes of one of England's good old stocks of mechanical engineers. His life in India spans over 30 years, prior to which he occupied a leading position in tin-works in South Wales. He now has charge of His Highness's gas-works, water-works, cotton presses, and all the mechanical details connected with his important post. The gas-works from the front entrance present the appearance of being of Continental design, and are very pleasing to the eye. They were built in 1875; and the present arrangement is capable of making four times the maximum output of 45,000 cubic feet now required per day. But there is no prospect or



Photograph No. 25.—The Palace of H.H. The Maharajah.—It is Brilliantly Lighted with Incandescent Gas-Lamps and Inverted Burners.



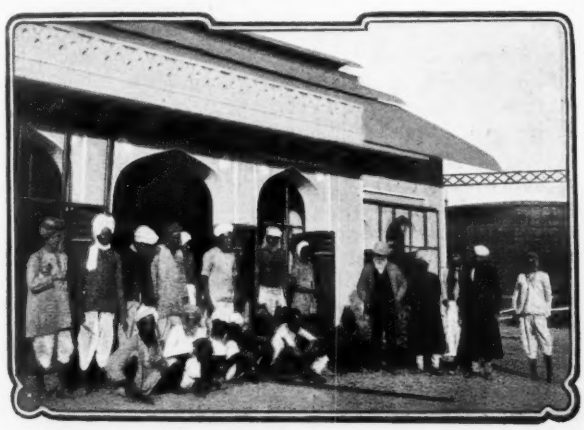
Photograph No. 26.—The Palace Grounds, Gas-Lamps, and Water-Tanks—the Plugs in the Tanks are for connecting-up Fairy Fountains.



Photograph No. 27.—The Guarded Entrance to Jaipur Oil-Gas Works.

thought of extension, as the demand does not increase, nor is it desired that it should.

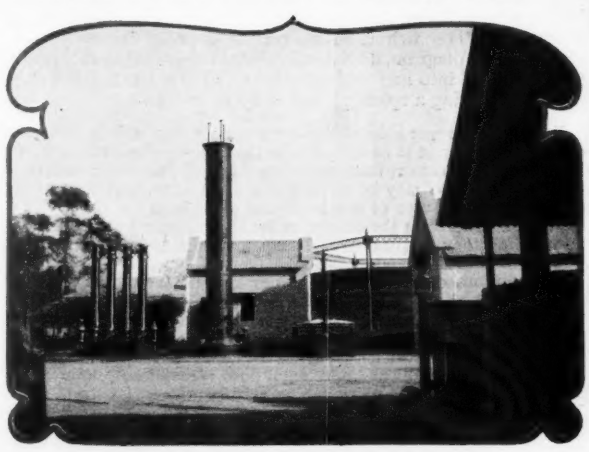
Mr. Dominy, being a busy man, no time was wasted; and the retort-house was at once visited. Kerosine oil is the distillate; wood being used for fuel. Only a very small quantity of coal is carbonized, with the object of getting coke, with which, or with charcoal, the retorts are partly filled, so that the oils can be cracked-up better and safer in the iron retorts. These are fed by a continuous sight-feed drip, and work at a back-pressure of $\frac{3}{8}$ inch. There are three benches of five oil retorts, 5 feet by



Photograph No. 28.—Outside the Retort-House.—A Group of Stokers with the Manager, Mr. J. Dominy.

8 inches in diameter, and two wood retorts, 5 feet by 12 inches in diameter; the latter being used for diluting the rich oil gas. All charging is done by hand; a group of stokers, with Mr. Dominy, being seen in Photograph No. 28, taken outside the retort-house. The house is clean, and everything seemed satisfactory.

Photograph No. 29 shows other apparatus in the works. The condensers consist of four ordinary 12-inch diameter cast-iron pipes, 9 feet long, with syphon pot. There is a Beale's exhauster, driven by a Campbell gas-engine. The scrubber is filled with boards; and is 4 feet 6 inches in diameter and 30 feet high. The



Photograph No. 29.—View of the Gas Plant.

two purifier-boxes are 8 feet square, and were supplied by Messrs. Robert Dempster and Sons, of Elland. The purifying material used is lime mixed with chaff. The station meter is of Messrs. Cowan's make. There are two gasholders, having a capacity of about 40,000 cubic feet; each being 45 feet diameter and 15 feet deep. The annual make of the works is about 3,300,000 cubic feet. The most important feature of these works is their self repairing and supporting character. Mr. Dominy has provided for all contingencies in the shape of a brass and iron foundry, fitting, blacksmith, tin and wood-working shops, and stores—in fact, the genius of the old English mechanic can be seen at every corner. He gives one word of command, and the natives fly in all directions. He stands no nonsense; but treats all with justice.

The bye-product plant is for the extraction of naphtha from the tar, and this is mixed with the oil and used over again. There is a large local demand for tar for disinfectant purposes as also for tarring timber.

The city is surrounded by a wall; and its streets are laid out on the draught-board principle. They are very wide thoroughfares; and all the buildings are painted or colour-washed pink; so that it is known as the rose-coloured city. One of the main

Photograph No. 30.—A Main Street in the Rose-Coloured City.

streets, with gas-lamps, is shown in photograph No. 30. There are 25 miles of mains and about 800 gas-jets, the average consumption of which is nearly 2 cubic feet per hour. Incandescent gas is not considered necessary, as the pressure would have to be increased and a greater consumption would follow. There are only 30 paying consumers; the largest consumption, of course, being in the palace and grounds. A good idea of the latter, with the water-tanks and plugs for connecting up fairy fountains can be got from photograph No. 26; and their brilliancy when fully illuminated by incandescent and inverted burners can well be imagined. Lastly, the writer thanks Mr. Dominy for his kind attention and reception, and trusts that his pretty little gas-works will long continue to turn out efficiently the required gas.

Photograph No. 31.—A Lantern Maker on the Road Side.

Delhi.

The writer arrived at Delhi in the early morning of Dec. 30 last. The drive through the city was disagreeable, as there had been no rain for five months, and everything was parched and burnt up amid piles of sand dust. Having inquired about the lighting, the writer found that there were no gas-works, though the population numbers 208,000. There are plenty of lamp-posts, but only for oil-lamps. An electric light works and tramway power station are being erected by Messrs. Bruce Peebles and Co., of Edinburgh; so that the whole place will be lighted electrically, but will be without all the advantages of gas.

Agra.

Agra, with its 200,000 inhabitants, was reached on Jan. 3, and proved to be a more pleasant town than Delhi. There are no

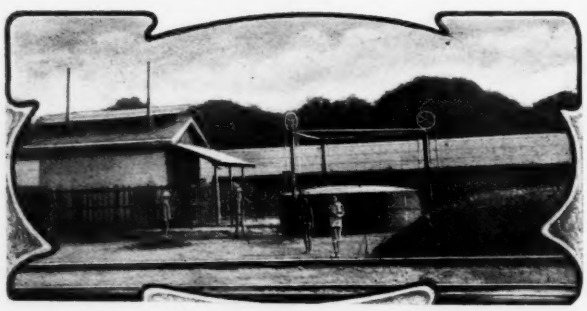
gas-works, or electric light either; but the oil-lamp again figures in the streets—houses and bazaars presenting a very old-time picture of the East. There appears to be no notion of establishing gas-works, nor, apparently, is there any real inducement to do so.

Cawnpur.

This town, apart from its memorable and heart-rending Mutiny incidents, is famous for its thriving woollen mills, which, with other manufactories, find occupation for some of its 197,000 inhabitants. There being these industries, the writer anticipated that there would possibly be a gas-works. But no, the town also is lighted by oil-lamps, both in streets and in houses.

Lucknow.

First impressions of this city were pleasurable, owing to the fact that the town is beautifully laid out with parks and cultivated spaces. It is well irrigated; the water being drawn from deep wells by oxen. The method adopted is different from that employed in Egypt, which was illustrated in Photograph No. 12.

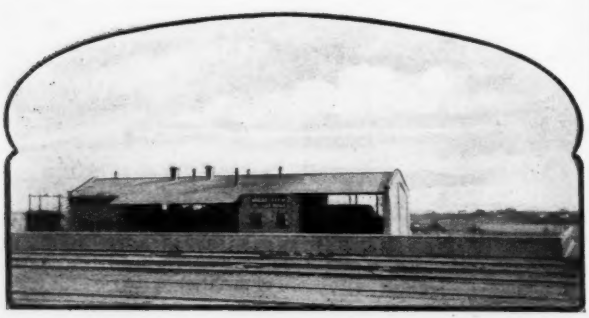


Photograph No. 32.—Oil-Gas Works for Lighting Benares Railway Station.

Here a pair of oxen walk down a decline, purposely cut out in the ground adjacent to the well, and lift, by means of a rope passing over a wooden wheel, a leather bag of about 8 cubic feet capacity containing the valued water. As the railway station is lighted by gas, the writer fully expected to find a gas-works at last in this city of a quarter-of-a-million people. But, once again, in the streets, houses, and hotels were the usual oil-lamps. Inquiries showed that the flat-flame burners on the station platform and in the offices were supplied with gas from a very small works about the size of an ordinary testing plant. The railway workshops were provided with electric light; so that no extensions to the gas plant were anticipated.

Benares.

Benares ranks as the religious capital of India, and every year about a million pilgrims from all parts visit it; thus adding to its permanent population of 250,000. The Hindus use the River Ganges for everything—as a refuse destructor, sewage receiver, washing, bathing, disposing of the dead, and, worst of all, for drinking. Consequently there is the greatest danger of plague and disease.



Photograph No. 33.—General View of Moghal-Sarai Oil-Gas Works.

The writer was again disappointed at not finding gas in use. Oil-lamps held the position everywhere. They are placed on cast-iron columns of similar design to the usual gas lamp-post with glass lantern. The writer visited a maker of these lanterns; and found a number of men at work squatting on the ground in a miserable shed by the wayside (Photograph No. 31).

The "ghats" and temples on the river side are appalling in their filth—the result of religious rites. Of all towns that need incandescent gas lighting, Benares is certainly the one that requires it most. The writer's suggestion is that the Indian Government should follow the example of the Maharajah of Jaipur, and give a grant in perpetuity to the large cities so as to build gas-works and light their streets free of cost. There are civil and military departments for keeping buildings, mosques, and temples in repair; and why should there not be a central lighting department, with proper staff, to be responsible for the public illumination of all towns above a certain size? The Maharajah of Jaipur lights up his town for his people; why should not other authorities give free light to their towns at night? Who can calculate the ameliorating effect of abundant public lighting upon the habits, the customs, the morals, and the well-being of this teeming population?

Before leaving Benares, it was ascertained that there were small gas-works for lighting the railway station. A visit up the line discovered a Mansfield's oil-gas plant, all contained in one building, except for a small gasholder, 15 feet in diameter (Photograph No. 32). The Superintendent mentioned that the incandescent lamps tried were not a success, although he had wanted them, for, as the writer found, the pressure available was not sufficient for them.

Moghal-Sarai.

This is an important railway junction on the way to Calcutta; and having a little time to wait, a visit was paid to the gas-works, of which a general view is given in Photograph No. 33. Only oil is used, cracked up in two beds of retorts, about 5 feet long and 10 inches diameter, three retorts being in a bed. They are heated by coal and wood. The works are compact, and consist of an engine and exhauster room, condensers, purifiers, meter, gasholder (20 feet by 12 feet) and governor.

Such were the small works and gas matters encountered in travelling across India. It was not so much what there was—from the gas engineer's point of view—as what there might be in these large towns of vast populations. And so the journey is resumed toward Calcutta.

THE ROUSSEAU LIGHTING DIAGRAM AND ITS SUBSTITUTES.

THE Rousseau diagram in the planning of what is called in the United States of America lighting "layouts" or installations, although not in everyday use, may possibly be of considerable service in that it affords a graphic method of determining the mean spherical intensity of luminous sources, and of comparing the work done by (say) various reflectors used therewith. It is a question, however, whether, by reason of its construction, it lends itself very readily to such purposes, and whether the work entailed in its preparation does not preclude the general adoption of the device.

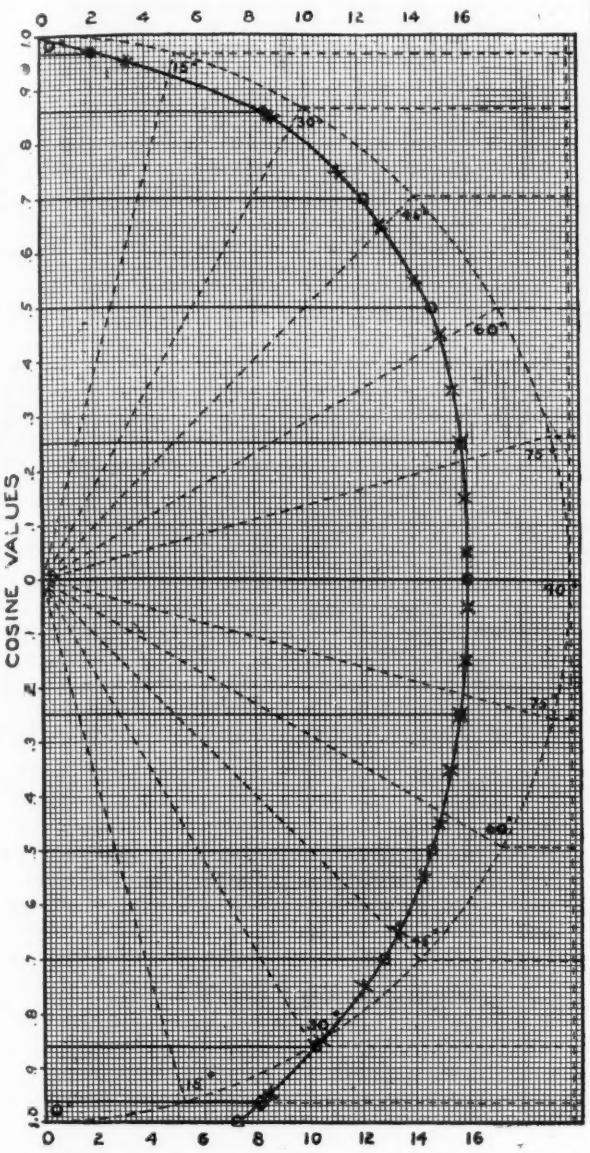
There are those who consider that the ordinary polar diagram is apt to mislead; but this need not be so in the hands of lighting engineers who know their work. The polar distribution curves are clear and familiar enough, and with the help of the ordinary slide-rule can be easily applied to the common problems of everyday lighting. Putting aside, however, the mere comparison of the two diagrammatic methods, there would seem some admission that the Rousseau curve is not as handy as it might be, and time and ingenuity have consequently been spent in the search for some modification and even substitute for the device. Of this, both the American "Illuminating Engineer" and the Illuminating Engineering Society have recently borne evidence in contributions devoted—one to a very convenient method of drawing the diagram, another to a construction designed to get approximately the same result by a short cut from the polar curve, and yet a third to the determination of the mean spherical candle power without the use of the Rousseau diagram at all. Before dealing with these papers, it may be useful to refer readers unfamiliar with the diagram to a description of the method which was given in the "JOURNAL" for Jan. 1, 1907, p. 32.

The first article alluded to is by Mr. W. S. Kilmer, and appeared in the pages of our American contemporary the "Illuminating Engineer." The writer, in suggesting a ready means of constructing the diagram, advises the use of cross section or squared paper divided into half inches, subdivided into tenths—the cross sections covering a space $7\frac{1}{2}$ inches by 10 inches.

Taking the longer side of the cross section as the base line, consider the semi-circle to be drawn from the centre, with a radius of 10. Taking this radius as 1, the lines of the paper divide it into tenths and hundredths, which may be marked along the edge, beginning at the centre. The distances of the horizontal lines from the centre line of the diagram represent the cosines of the angles, described by the radii from which they are drawn, and may therefore be obtained from a table of natural sines and cosines.

The positions of the horizontal lines for a polar diagram using 15° angles can be at once determined by simply reading their corresponding cosine values, taken from the table, on the scale along the base line. These have been indicated by solid lines in the figure, which, of course, would coincide with the dotted lines, if extended. The actual drawing ot the semi-circle, radii, and horizontal lines, is therefore quite unnecessary, the rulings of the paper can be readily utilized for the purpose. Having thus located the horizontal lines, the candle-power values can be plotted with equal readiness by using the vertical rulings of the paper as a scale.

A single example will make the whole matter clear. For this purpose let us take the case of the ordinary 16-candle power lamp. The



intensities at the various angles as given by the Bureau of Standards are as follows:—

Lower Hemisphere. Angle.	Candle Power.	Upper Hemisphere. Angle.	Candle Power.
0	7·2	0	0·0
15	8·1	15	2·0
30	10·2	30	8·5
45	12·8	45	12·2
60	14·6	60	14·7
75	15·7	75	15·8
90	16·0	90	16·0

The most convenient scale for plotting these values will be the one given at the bottom of the diagram. The several candle power values then fall at the points indicated by the O's, through which the required curve is drawn.

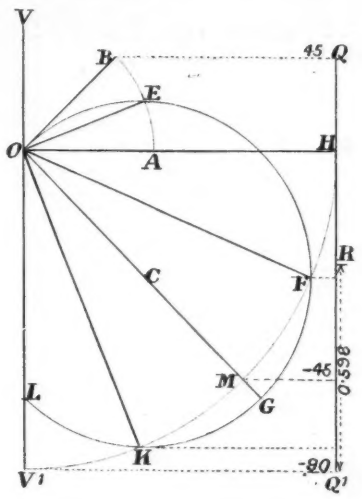
Lower Hemisphere.	Upper Hemisphere.
8·4	15·9
10·4	15·8
12·1	15·6
13·3	15·4
14·2	15·0
14·9	14·3
15·4	13·0
15·6	11·4
15·8	8·6
15·9	3·0
136·0 ÷ 10·0 = 13·6	128·0 ÷ 10 = 12·8
13·6 + 12·8 = 26·4.	26·4 ÷ 2 = 13 2 = M.S.C.P.

To obtain the mean spherical candle power, the curve may most conveniently be divided into ten zones to each hemisphere, each zone being ½ inch in height. The mean candle-power value for each zone will read off at the point where the quarter-inch line which is the centre of the zone crosses the curve. These points are indicated by X's on the diagram, and their values read from the scale at the bottom, are as given in the preceding table.

The sum of these values, divided by the number of zones—ten for each hemisphere—gives the mean hemispherical or spherical candle power required.

Following this article, Mr. Norman Macbeth makes a suggestion for determining the mean spherical candle power without using the Rousseau diagram. He refers to Mr. Kilmer's method, in which the readings, used for getting the spherical candle power from the curve, are taken on lines running through the centres of the ten different zones into which each hemisphere is divided. If this method is worked backwards, by determining the angles on the polar diagram corresponding to the cosine values, on which these lines are drawn, and reading the candle power intensities at these angles, it is then only necessary to add these values and divide the sum by ten, to arrive at the spherical candle power. In order to use the method, the angles may be drawn on transparent celluloid or tracing cloth of convenient size to place over the polar curves which are to be read. The candle-power values at each of these angles can then be read direct from the polar distribution curve. The sum of these values divided by ten gives mean hemispherical candle power. If mean spherical power is wanted, all that is necessary is to add the values thus obtained in both hemispheres, and divide by 20.

Dr. A. E. Kennelly, with much the same end in view, subjected the polar diagram to different treatment in a paper recently read before the New England Section of the Illuminating Engineering Society. He refers to the Rousseau diagram as essentially a graphical construction based on the mean polar curve of luminous intensity which yields the mean spherical intensity as the area of a certain figure bounded by straight lines. This area has to be measured for the determination of the mean spherical intensity. The author's construction arrives at the same result in the form of a straight line capable of being scaled, and requiring no area measurement. He claims therefore it is much simpler, easier, and quicker than the Rousseau method. Considering that his diagram is best explained by referring to an actual example, he describes one in the following figure.



The curve O E F G K L represents the polar distribution curve of a particular luminous source occupying the vertical point O. This curve has been taken as a segment of a circle, with diameter O G taken as unity, and depressed 45° below the horizontal plane O H. The reason for selecting such a circular polar curve is that its mean spherical intensity is easily computed, and is 0·593 in terms of the intensity O G as unity. The new construction is as follows: First select the number of zones to be employed in altitude. In the figure there are three such zones of 45° each—viz., H O B, H O G, and G O V. Mark off the middle angular points of the zones O E, O F, and O K.

Commence, say, in the upper hemisphere. With centre O and the radius O E of the midzone, draw the arc A E B through an angle of 45°. Draw the line O B to the end of this arc.

Turning next to the lower hemisphere, describe an arc with centre O and the radius O F of the first midzone to M, through 45°. Connect O and M by the line O M. Measure back along M O a distance equal to the radius O K of the second midzone, and mark off this distance at a point which shall serve as the centre of the next arc. It happens in this particular case that the new point coincides with the point O. With this point as centre, and with radius O M, draw another 45° arc from M to V'; so that O V' makes an angle of 45° with O G, and also 90° with O H. Draw the line O V'.

Take any convenient point, such as H, on the horizontal line, and draw a perpendicular QQ' through the same parallel to VV'. In some cases it may be convenient to employ VV' itself, without erecting the new vertical QQ'. Project the terminal points B and V' horizontally upon QQ'. Bisect the intercept QQ' in R. Then either the distance QR or Q'R will be the mean spherical intensity of the luminous source, to a degree of approximation depending upon the accuracy of the graphical construction and upon the number of zones selected. As shown, the distance Q'R is 0·598 if OG is unity. It is easy to show that if the geometrical construction were made without error, and Q'R were scaled correctly, the length would be 0·5973 as far as four significant figures. Comparing the actually measured length 0·598 with the theoretically deduced value of 0·5933 given above, it will be seen that in this instance, with only three zones, the result of the graphic construction is correct within 1 per cent. As a general rule, however, 45° zones may introduce an error of 2 or 3 per cent. The apparent spherical reduction factor = Q'R/OH.

Moreover, since the total flux of light emitted by a virtual point source is 4π times its mean spherical intensity, it follows that if a circle were drawn with radius QQ′, the length of the circumference would be equal to the total luminous flux emitted by the source O. Further, if the polar intensities are scaled in candle power, then 2π QQ′, or $7{\cdot}52 \times$ OG will be the total luminous flux in candle-lumens. If the polar intensities are scaled in hefners, then 2π QQ′ will be the total luminous flux in hefner-lumens. Further, the total flux in the upper hemisphere will be 2π QH lumens, and the total flux in the lower hemisphere will be 2π HQ′ lumens. If we should desire to know how much flux is emitted between the horizontal plane and the depression angle 45°, we should measure H – 45, and multiply by 2π. Similarly 2π times the distance along QQ′ between any two projected points is equal to the total flux emitted in the angular zone between the corresponding points in the polar curve. Or, expressing the same condition in another way, the distance along QQ′ between any two projected points is numerically equal to the flux in lumens per radian of azimuth, emitted in the corresponding zone on the polar diagram.

Again, HQ is the mean upper hemispherical intensity, HQ′ is the mean lower hemispherical intensity, and the mean spherical intensity is seen to be the arithmetical mean of these two hemispherical intensities.

Having given this as one example, the author elaborates the diagram and description, using successively zones of 30°, 20°, and 10°. With each increase in the number of zones, the geometrical work is greater, but is attended by a higher degree of precision in the final result. The 20° zones are recommended for reliable work in practice, and with this construction a result within 0·76 per cent. of the theoretically correct value can be obtained. In many cases, however, 30° zones are sufficiently small.

Dr. Kennelly devotes the remaining part of his interesting paper to a mathematical demonstration of the method.

GAS AFFAIRS IN THE UNITED STATES.

[Communicated.]

Our American gas journals have, since the beginning of the year, had their pages well filled with the proceedings of various Gas Association meetings; and there are several more meetings scheduled between the date of this writing and the end of June. Prior to the formation of the American Gas Institute, most of the men prominent in the gas business attended the meetings of two Gas Associations yearly, and some went to three. With the amalgamation of the American, the Western, and the Ohio Associations to form the Institute, it becomes difficult to find a good reason to attend more than two gas meetings a year; but there is generally a very good reason to attend two—one the Institute meeting, and the other the meeting of some State Association.

The States, or groups of States, now represented by local Gas Associations are: New England, New York, Indiana, Illinois, Michigan, Wisconsin, Iowa District, Southern, South-Western, and Pacific Coast. A Canadian Association is also in process of formation, with its first meeting in Toronto this month (June). All reports go to show that the meetings of these local Associations are quite successful in point of attendance, in the interest aroused by the subjects discussed, and in the general nature of the discussions. The American Gas Institute, with an actual attendance at sessions of about two hundred, is getting to the stage where the average man is afraid to say anything from fear of his audience. In the local Associations, however—especially in the small ones, where the attendance may be thirty or forty, more or less—the sessions are in the nature of friendly gatherings. Ideas are advanced with resultant good, both to the speaker and to his audience, which ideas would have been considered too trivial for the Institute.

Another advantage of the local Associations, and the prime cause of their formation, is to enable the gas companies of any State to act as a united body with reference to proposed legislation or regulation by commissions. For some months, conferences have been in progress, both in New York and Wisconsin, between the respective State Commissions and Associations. To show the extent of at least proposed regulation, it will suffice to say that in New York, a Bill has been introduced making it a serious offence for any company to keep any set of books except along the lines prescribed by the Commission. It is hoped that the Bill has been killed; but if it should pass, then any company which believed that the system of accounts as prescribed by the Commission did not show operating results in the way most conducive to economical management, and therefore desired to keep one set of books for the Commissioners, and another set for the economy to be gained thereby, would not be allowed to do so.

In connection with the New York Commission, it is reported that one of the small companies was so appalled by the detail of a proposed system of accounts, on which criticisms were invited, that a reply went to the Commission saying that if these accounts were made obligatory, the company must cease operations.

As your readers may know, the National Commercial Gas Association was organized several years ago, to devote especial attention to popularizing the use of gas, and to afford an opportunity for the manufacturers of gas appliances to, on an even footing, meet the officials and other employees of gas companies. Heretofore, the meetings have been held in New York City; and at two of them there has been an exhibition of gas appliances. The next meeting will be held in Chicago in December, and the proposed exhibition of appliances will be made as extensive and interesting as possible. The Exhibit Committee will be composed of four representatives from the Commercial Association, and three from the Institute, which has decided to give up the exhibit planned for its next October meeting, and by uniting with the Commercial Association, have one creditable display. It is thought that, in time, some affiliation agreement between the two Associations may be worked out, which would provide for a joint meeting; and in this way the Institute members would get the advantage of a good exhibit, while the traders in the Commercial Association would greatly benefit from a better attendance of potential buyers. When the Institute begins to hold section meetings, after the fashion of the British Association, there are some of us who would like to see the National Commercial Gas Association dissolve and form part of the Institute's new business section. All traders would be associate members only of the Institute; but in section matters they would have voting and all other membership privileges, and would be expected to be very influential in, and perhaps often control, section affairs.

The mention of affiliation recalls the fact that the Illinois and the Wisconsin Associations are now affiliated with the Institute, and have named their representatives to be added to its Board of Directors.

At recent meetings of two local Associations, there were papers on meter repairs; and in both cases the writers were of the opinion that any meter that had been in use two years should be opened for examination. It is true that one writer would not bring in a meter for no other reason than having been in service two years; but if such a meter was brought in for no reason affecting its condition, he advocated opening it, if it had been two years in service. It would be interesting to know whether these two writers derived the reason for such a practice from close observations of meters brought in from service, or from having read that it was "good practice" to do this, and that the "best companies" did so. In one of the discussions at least, it was shown that much money may be wasted by adhering to such an arbitrary and short time-limit. What "best practice" in regard to proper maintenance of meters is rapidly getting to be, may be summed up as follows: First, watch your ledgers; second, where bills show a marked decrease, test the meter at the house for registration on a small flame; third, remove the meters that fail to pass such a test; fourth, at intervals of a year or so, remove a small number of meters which have been out (say) five years or more, and from their condition, judge whether more removals are necessary. Along these lines lies economy—becoming each day more imperative in this country, with rising prices for raw materials and ever lowering rates for the finished product, gas.

Miners Eight Hours Bill Condemned.

There has not been a more lucid and well-reasoned denunciation of the Eight Hours Bill than that by Mr. A. F. Pease before the shareholders of Pease and Partners at Darlington—the "Pall Mall Gazette" remarked in their "City Notes" last Thursday. He pointed out that consumers had begun to appreciate the fact that the Bill would probably affect them more than colliery owners, who, he frankly confessed, might for a time make very large profits. He thought the Bill would put a tax of from ten to fifteen millions sterling a year on trade. He denied that coal mining was unhealthy, though it was dangerous, and, compared with other occupations, he considered the men had reasonable hours and fair wages. Mr. Pease continued to show the effect of the Bill on the consumer. He first dealt with the increase in the price of house coal. But he was most afraid of the effect on the iron trade; for over 30 per cent. of the output of coal in Durham was used in the manufacture of iron. If the price of coal were put up permanently, it would place a stone round the neck of the iron trade, which would make it difficult to compete with foreign nations. In conclusion, he said that the four chief reasons which had induced capitalists up to the present to choose this country for carrying on cotton, woollen, and iron trades was: (1) climate, (2) efficient and reliable labour, (3) more freedom from devastations of war or interferences by unjust taxation, and (4) a cheap supply of coal. There seemed, said Mr. Pease, some danger of partly losing all of these advantages except the first.

The Fixation of Atmospheric Nitrogen.—At the meeting of the Faraday Society last Tuesday, Dr. Albert Frank, of Berlin, read a paper on "The Utilization of the Atmospheric Nitrogen in the Production of Calcium Cyanamide, and its Use in Agriculture and Chemistry." The author described his method of producing a new compound to which the name of "Nitrolim" has been given, and for which a high value as a fertilizer is claimed. It appears that, when the material is spread on trays fixed one above the other in towers up which steam is passed, ammonia is liberated; and this being absorbed by sulphuric acid, sulphate of ammonia is formed. It was intimated that decomposition into ammonia and calcium carbonate takes place very slowly in the soil—the former being absorbed and held by the mould; and it is claimed that second crops profit from the nitrogen which is not absorbed by the first. Works for the production of "Nitrolim" have been established at Odda, in Norway. Its present price in Germany is rather lower than that of Chili nitrate; and it is stated to be 10 per cent. cheaper than sulphate of ammonia, regard being had to the available nitrogen in the two materials.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Visit to the Works of Messrs. R. Dempster and Sons, Limited.

Somewhat off the usual lines was the visit arranged for the members of the Yorkshire Junior Gas Association last Saturday, when they were shown over the works of Messrs. R. Dempster and Sons, Limited, at Elland. The invitation to do so had been spontaneously extended to them by Mr. J. W. Broadhead, the Managing-Director, on the occasion of their visit to the Longwood Gas-Works twelve months previously. The occasion had been anticipated with no small degree of interest and expectancy, as it was realized that not only would there be the inspection of the machinery of an up-to-date engineering establishment, but also the exceptionally valuable and educational privileges of inspecting many models and drawings of gas-works plant, and of examining a yard full of plant in various stages of completion. Perhaps this last consideration had loomed largest in the anticipation of the members, as in inspecting any fresh type of plant at gas-works it is generally seen closed, and often in a not very accessible position; while here it was open, in course of construction, and on the ground level. Nothing that Messrs. Dempster and Sons could do was left undone to secure all these advantages to their visitors. But the command of weather suitable for the leisurely inspection of what was in the yards was unfortunately beyond their control; and, as the afternoon was one of almost continuous heavy rain, this part of the proceedings could not be carried out with the same thoroughness as was originally intended both by visitors and their guides.

The visitors assembled in the magnificent drawing offices, and were there received by Mr. Broadhead, with whom were the chief members of the staff, including Mr. C. T. Jacobs, the Secretary of the Company, Messrs. E. J. King, H. J. Toogood, R. M. Brooke, and W. H. Handley, all of whom subsequently acted as guides. Among the visitors were Mr. J. H. Brearley, of Longwood, and Mr. J. W. Turner, of Mirfield; while letters apologizing for unavoidable absence were received from Mr. T. Duxbury, of Oldham, and Mr. J. Wilkinson, of Halifax.

In welcoming the visitors on behalf of his firm, Mr. Broadhead recalled the circumstances under which the original invitation had been extended, and expressed his great satisfaction that so large a company had assembled in acceptance of it. Though they were at the present time very busy, he was afraid that they had not much of interest to show, inasmuch as practically all their orders had to be completed as quickly as practicable. Had it been possible to keep back work for a few weeks, they would have been able to ensure an inspection of more varied interest; but he hoped the visitors would not be disappointed by the time they had completed the round of the establishment. The works were commenced in a small way 53 years ago, since which time they had grown to large dimensions. They had been completely modernized and brought up to date during the last ten years, till now they were in every way equipped for expeditiously turning out a large quantity of very high-class work. The offices were built about four years ago, and in designing them nothing was spared to enable the staff to do their work with every comfort. They were spacious, airy, and well ventilated. The upper floor of the building contained the drawing office, 84 ft. by 33 ft.; while the lower floor was devoted to the commercial side. Large as were these rooms, they were not much beyond the needs of their present staff of 34 members. The works in all covered an area of more than 10 acres, and employed about 450 men inside and about 300 men outside—the latter consisting of retort-setters, ironwork erectors, &c. The works consisted of three sections—boiler and gasholder shop, fitting shop, and foundry—and were driven throughout by gas-engines; there being four of 45 I.H.P., one of 25 I.H.P., and one of 9 I.H.P. The gas used was "blue" water gas made by the firm from coke from the Elland Gas-Works. They had also a 20-ton electric overhead crane and a 10-ton rope-driven one, besides several electric motors, dynamos, hand cranes, and a steam travelling yard crane.

While they would be pleased to show them all their plant, it would have given a better impression if all could have been seen in full swing, and the whole staff actively engaged. Just then they were busy with steel tanks and gasholders, and in the yard several would be seen in course of construction. The firm were one of the original constructors of spiral-guided holders; and they had always contended that, when understood and appreciated, these holders would be realized as stronger than those of any other type. The fact that of all the many holders they had made for several years very few had external guides, while all firms making holders now included spiral-guided ones in their work, pointed to the fact that they were "the coming holders," and that for all sizes the older type was doomed. All theirs were made with Dempster's patent continuous diagonal plates. No gasholders were exactly "things of beauty;" and though the spiral-guided ones were at least no worse than those with guide-framing, they had the advantage of leaving nothing in sight when empty.

Parts of the firm's patent stoking machinery might be seen in course of construction in the fitting-shop. Their first machines were installed at the Falkirk Gas-Works; and so well had these performed their functions that an order had been placed with them for an extension to the carbonizing plant by altering the settings from eights to twelves, and including the necessary alterations in the machines, overhead hoppers of 120 tons capacity, and push-plate conveyor 120 feet centres. They were reconstructing these settings by first converting eights to nines in the ordinary way, then raising the arch of the setting and putting in another tier. As the hydraulic main had originally been fixed at a good height, it had not needed to be disturbed; and the problem of the ascension-pipes had been dealt with by having one only for each through retort, and putting six at one end and six at the other. Since the adoption of these machines, they had at Falkirk dealt with about 50,000 tons of coal of all varieties with marked success in decreasing carbonizing expenses with a minimum cost of maintenance.

The members had many of them seen the charging-machine when they lately visited the Longwood Gas-Works; so he need not further refer to it. However, as the firm's later pusher discharging machines for other works had been constructed without wire ropes, a few words of explanation might be desirable. The Falkirk pusher consisted of tubes filled with water for cooling purposes, and operated by wire ropes. When designed for narrow retort-houses, more sections were needed for the ram, and consequently more ropes and stuffing-boxes; hence the machine became rather more complicated. To meet this, their latest patent pusher discharger had been designed. While altering the Falkirk machine to suit the increased height of the retorts, advantage was being taken of the opportunity of modifying the parts, so as to get two independent ropes to operate the first length of ram, instead of one $\frac{3}{8}$-inch rope in double purchase. Then, in the event of one breaking, the other could continue to do the work till it was convenient to put a new rope in.

Seeing how widespread was the adoption of labour-saving devices in conveying plant, &c., and the need of the Juniors becoming conversant with their details, particular attention was invited to their patent friction clutches, their patent variable-speed countershaft, and their patent equalizing gear, which Mr. Toogood would explain on the works and from the models in the drawing office. In the erecting yard, among the gasholders being constructed would be seen a large coal elevator to handle 70 tons per hour at 80 feet per minute; also a complete coke plant for elevating screening, loading into carts or railway trucks, and stacking in 20-ton hoppers or in the yard. Up to the present, all their stoking machinery had been operated by electricity; but Mr. Toogood had invented a rope-drive, which, while embodying no new principle, gave the same flexibility and portability as could be obtained from electric motors.

Their business varied oddly from year to year. Some years brought a run on holders, others on condensers or retorts, and so on. This year they had had a run on purifiers, and already had received orders for about 45—most of large dimensions and all on "Green's" system. They were one of the first firms to make a speciality of these purifiers, and had already erected 250 of them. They would find in the yard several of Weck's valves; also one of their patent connectionless valves attached to the neighbouring parts of the purifier sides, so that they could see how it worked, enabling purifiers in square to be coupled up very simply. They had already supplied or had on order eleven of these arrangements, and on the tables would be found photographs of a 20-inch valve just supplied to the Oldham Corporation.

About ten years ago, they commenced to employ their own retort-setters, and specialized in this class of work. At first they took up the late Mr. W. R. Chester's setting, the special feature of which was the projecting furnace. Then he had invented a corrugated tile to form the division between the waste heat and secondary air passages. After this they adopted the Waddell system, as being more efficient; and this had been largely employed in the United Kingdom. In this setting the waste gas was conveyed inside 12-inch horizontal fire-clay tubes, which were surrounded by the incoming secondary air. Ever ready to adopt improvements which really represent better results, they were now installing the Brooke regenerator, invented some eighteen months ago by Mr. R. M. Brooke, who had charge of the retort-setting branch of their business. One of these regenerators had been specially built in the yard, in order that the visitors might be able to grasp its construction clearly.

Finally, he would call their attention to the Everitt patent tar fog and naphthalene extractors. They had six of these on order for Dundee, Perth, and Coventry. Parts of the castings would be found in the yard, and actual-size drawings were on the office walls. These extractors had proved very efficient, and were giving great satisfaction; and the firm had put in many—in fact, two had been ordered that day.

The visitors then went round the works and yards in parties, having the advantage of the presence of Messrs. Toogood and Brooke to describe their respective patented constructions. The Brooke regenerator came in for much close inspection, and suggested some persistent question-putting. The erection of a furnace with one complete side of a regenerator, all on full scale and exactly as on a works, was a tangible and very impressive proof of how thoroughly the firm had laid themselves out to give the visitors the most profitable time that could be managed. The setting has already been described and illustrated in the "JOURNAL."* It has effected the production of 12,000 cubic feet of gas per day per mouthpiece in 10-feet retorts, with four-hour charges of 4 cwt.; and according to certain unpublished tests, it had done a good deal more than this. With the secondary air passing through two parallel sets of travel on each side of the furnace, through

* See Vol. XCIX., p. 172.

9-in. by 6-in. tubes (external dimensions), and the waste gases playing on all four sides of these tubes, very thorough and even heating of the air-ducts is secured; and as, in addition, all joints are in the walls, and the weight is taken off the tubes, the chances of fracture in them is reduced to a minimum. All dampers are very easily accessible, and as the waste gases are confined in their vertically downward travel within separated compartments formed by continuations of the stay walls, each of these has a damper regulating the amount of the waste gases drawn down it, and so the heat of each part of the setting is under very close control. The Toogood variable-speed countershaft has been described and illustrated in the "JOURNAL;"* and on Saturday it excited great interest both in the working model and as installed on the large scale in the fitting-shop. Incredible as it seemed on the first statement, with a rope-drive going continuously in one direction and at one speed, by the movement of an adjustment lever this was converted eventually into forward or backward motions of various speeds, and even into an arrest of motion—proving the patentee's claim for its applicability to the working of charging and discharging machines.

The water-gas plant was seen in actual operation, each party having a run and blow worked for them. The plant is of the Dellwik type; the normal blow being 1 minute and the run 11 to 12 minutes. After cooling and purifying, the gas is passed into a holder ready for use about the works. One man attends to all the work of the plant, and usually keeps the engines supplied by operating the plant for alternate periods of about 2½ hours during working hours. Its capacity is from 6000 to 7000 cubic feet per hour. No steam is used in any of the shops, so in place of steam-hammers pneumatic hammers (*i.e.*, worked by compressed air) are used.

Besides the pieces of plant referred to by Mr. Broadhead, attention was especially attracted by an unusually massive steel-jawed cannel-breaker, full sized samples of a plate-belt conveyor and Dempster's hot-coke conveyor, and some of the firm's forms of hydraulic main with special facilities for cleaning out pitchy obstructions without interfering with the work of any of the settings. Valves of various sorts, some opened out for inspection, were seen on all hands, and the various forms of the Weck valve very closely scrutinized. Not only were several large holders seen in course of erection, but a special section of a lift of a Gadd and Mason spiral-guided holder had been prepared, so that all the various details of construction could be clearly seen, especially the use of the continuous diagonal plate and the vertical stays in strengthening the sides of the holder. In returning to the offices, an interesting relic was pointed out on the wall—an old cast-iron retort-lid which a few years ago was delivered into the yard among other scrap, and on which was cast "Butterfield and Dempster 1858."

On reaching the drawing offices, the visitors partook of tea, provided by the firm. Subsequently the President, Mr. J. H. Hill (York), proposed "Prosperity to the Firm of Robert Dempster and Sons, Limited," and thanked the firm and their officials for the many kindnesses of the day, and for their whole-hearted endeavours to give the visitors a "good time." The proposition was seconded by the Senior Vice-President (Mr. H. Butterfield), and supported by Mr. J. H. Brearley, who endorsed what Mr. Broadhead had said about spiral-guided holders, and congratulated the firm on their new retort-setting. In responding, Mr. Broadhead thanked the speakers for their kindly references to the firm. He assured them that their one motto was always to turn out only first-class work, so that they might be gladly welcomed as contractors wherever they had once done work. He hoped that the members had profited by their afternoon's visit, for so varied were the calls upon a gas manager that no chance of extending his knowledge and experience was to be neglected; in fact, the spending of some time in the service of a gas engineering firm would be a valuable adjunct to a manager's training, as many of their former employees were now realizing in their gas-works experience. He extended his best wishes to them as an Association and as individuals; and if they would accept a word of advice from him, he would urge them to apply themselves to the serious study of drawing and general draughtsmanship. Mr. E. J. King and Mr. C. T. Jacobs also responded.

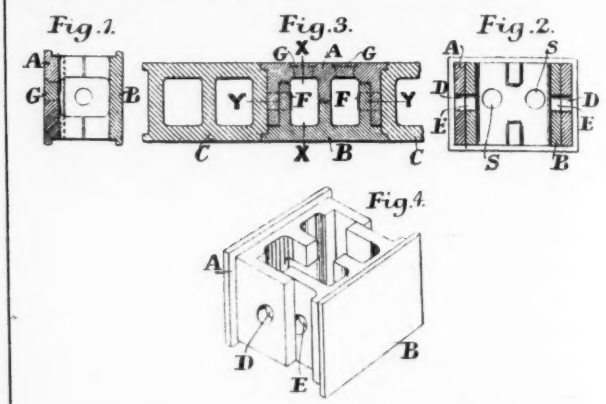
Subsequent speeches were made congratulating Mr. E. J. Sutcliffe and the other members who had recently received promotion in connection with the re-arrangement of the staff of the Bradford Gas Committee; and Mr. J. H. Brearley on the award to him of the Institution's "London" Gold Medal for his paper on "The Testing and Hygienic Efficiency of Gas-Stoves," read at the meeting in Dublin last year. These gentlemen suitably responded, and a most enjoyable evening was closed by a speech from Mr. J. W. Turner, of Mirfield, one of the honorary members, who has frequently honoured the meetings with his presence, and always taken a warm interest in the welfare of the Association.

* See Vol. LXXXVIII., p. 410, and Vol. XCVII., p. 814.

An old cast-iron pipe has lately been uncovered in the excavation for the bridge loop subway in New York which was connected directly with a hollow-log pipe forming part of the waterworks of the Manhattan Company. The joint was made by merely driving the end of the iron pipe into the ends of the hollow log. The cast-iron pipe was in good condition, free from serious corrosion, and could be used again. The joints were made with lead.

FACING-BRICKS FOR RETORT-SETTINGS.

A recent number of the "Journal de l'Eclairage au Gaz et à l'Electricité" contains the specification of a patent taken out in France by Herr Hans Ries, the Manager of the municipal gas-works at Munich, for the production of bricks specially suitable for facing or repairing the walls of generator settings of retorts. The patentee points out the importance of being able to take out a damaged brick in a retort-setting and substitute a sound one without interfering with the adjoining bricks or obstructing the circulation of the hot gases; and he claims that this object can be realized by means of his invention. In the accompanying illustrations, fig. 1 is a vertical transverse section on the line XX, and fig. 2 a vertical longitudinal section on the line YY, of fig. 3, which is a horizontal section of several bricks placed side by side; fig. 4 being a perspective view of a brick in two pieces.



The brick patented by Herr Ries consists of two parts A B, which may be fitted one into the other as shown in fig. 4, and has lateral faces so formed that when it is placed in position it is in the same plane as its neighbours. In fig. 3, the brick is enclosed on both sides between ordinary facing-bricks C; and it will be seen that the parts A B may be inserted in the two sides of the wall without necessitating the removal of the ordinary bricks. All that is required is to form, in one of the adjoining bricks (in fig. 3 it is the right-hand one), a groove to receive the lateral rib of the movable brick. In the transverse walls of the half-bricks there are openings D and E, which allow of the half-bricks being joined by means of a pin F (see fig. 3), which may be inserted from the outside through the lateral openings S (fig. 2), which are closed by pieces G, as shown by the dotted lines on one of the sides of the brick in fig. 3. The movable bricks form with the others interior channels serving to conduct the hot gases.

The late Mr. Frank Henley Leeds, whose death was recorded in the "JOURNAL" for the 3rd of May, left estate of the value of £5789 gross and £5716 net. The personal estate in England of Mr. C. H. von Siemens, the late Chairman of Siemens Bros., Limited, is valued at £33,588 gross. Mr. Edwin Foster, a partner in the firm of Messrs. E. Foster and Co., coal merchants, of John Street, Adelphi, whose death was recorded in the "JOURNAL" for the 14th of April, left £53,505. Deceased bequeathed the goodwill and capital of his business to his nephews, Reginald Wilson Foster and Harold Duncan Foster, who inherit, in association with his brother, Trotman Foster, his interest in the South Pelaw Collieries, of which he was one of the principal owners.

According to a column of "Gossip" in a recent issue of "Motor Finance," rumours are current that there will be an upward move in Coalite Syndicate shares. If this turns out to be true, says "Rialto," it will give a number of waiters, porters, and liftmen at various hotels in this country and abroad a chance to get out of their holdings. Our contemporary adds: "May we also hope that, in the event of a rig, others will be able to realize shares which Messrs. Salisbury-Jones, T. Parker Kitching, H. Webber, and H. J. Lawson are not prepared to buy." Another paragraph says: By a recent communication from the Directors of Coalite Limited, the shareholders were informed that the erection of the works at Barking was proceeding satisfactorily. A representative of "Motor Finance" last week visited the Barking dust heaps; but all that could be discovered of the alleged progress were excavations for a few yards along the foreshore containing a few concrete or stone foundations and girders. We understand that the work has been proceeding for seven months. We learned also that operations had been carried on very spasmodically, and that although probably thirty men were then working, their numbers had often been reduced to as low as half-a-dozen. At the present rate of progress, we think the shareholders may expect to see their Barking works commencing to manufacture Coalite by the time the millennium dawns. Shareholders should visit the Thames foreshore and see for themselves how dim and distant are the dividends that were "anticipated" in the prospectus.

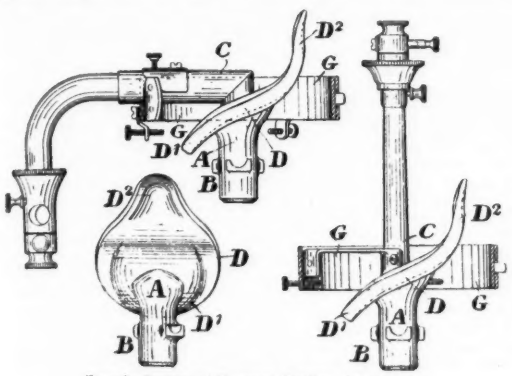
REGISTER OF PATENTS.

Inverted Incandescent Gas-Burners.

BRAY, J. W., of Leeds.

No. 23,267; Oct. 22, 1907.

This invention relates to a deflector combined with a burner-nozzle in such a manner that the support connecting the gallery or globe-holder to the burner proper is protected from the action of the products of combustion, which are also, by the same device, prevented from coming into contact with the air-admission apertures in the bunsen tube.



Bray's Inverted Burner Fitting Protector.

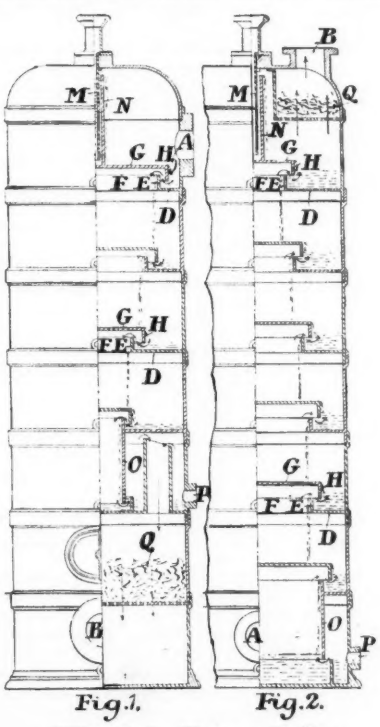
The nozzle and deflector may be applied to practically any form of inverted incandescent gas-burner, whether vertical, horizontal, reversible, or swan neck. The nozzle A, provided with a mantle carrying device B, is made preferably in porcelain or similar non-corrosive material, and carries, or has forming part of it, an obliquely placed deflector D, of such a shape that it collects the products of combustion from the burner immediately above the burner, and throws them off above the gallery G. The most suitable form of deflector is made of porcelain or the like, in the form shown—consisting, as it were, of a downwardly projecting portion D^1 and an upwardly projecting portion D^2. These two wings (made in one or more pieces) are preferably slightly hollowed, as shown by the dotted lines. The tube C is attached to the nozzle and deflector, and carries a bracket E, whereby the gallery or globe-holder is attached to it.

Gas Washing or Purifying Contrivance.

WILLIAMS, H. W., of Abertillery.

No. 572; Jan. 9, 1908.

This invention relates to a washer of the type in which the gas is required to pass in bubbles through a succession of very short columns of water, and through (or in company with) a succession of screens



Williams's Gas Washer or Purifier.

composed of drops of falling water; and it consists in the provision of means whereby the successive passages for the gas are progressively smaller, so as to compensate for the decreased volume of the gas due to its cooling.

In the arrangement shown in fig. 1 (in which the gas descends), the provision of the short column of water, through which the gas is required to flow, is effected as follows: Into a circular chamber whose axis is vertical, a horizontal circular shelf D projects from the sides, and is formed with an upstanding ledge E surrounding a circular aperture F. This aperture is covered by a shallow cap G, the downward projecting sides H of which surround the ledge of the shelf and leave an annular space between them. The construction is such also that a space is left between the shelf D and the lower edges of the sides of the cap G, and also between the under surface of the cap and the upper edge of the ledge of the shelf. If water were to be dropped on to the shelf and gas to be supplied to the chamber above the shelf, the gas (being under a slightly greater pressure than that maintained in the portion of the chamber below the shelf, either by means of a vacuum at the drawing-off end B or by a plenum at the admission end A of the chamber), the level of the water on the shelf which is outside the cap would be forced down to the level of the lower edge of the sides of the cap; the water thus displaced being forced into the annular space between the sides of the cap and the ledge of the shelf, and caused to overflow the latter into the portion of the chamber below. Thereafter, the gas itself would be forced below the lower edge of the sides H of the cap and bubble upwards through the water contained in the annular space between the sides of the cap and the ledge of the shelf and find its way through the aperture F, and thus reach the portion of the chamber beneath.

By means of the plurality of shelves similarly fitted and provided with caps and superposed on one another (as shown), the gas is repeatedly operated on. The difference of pressure required to pass the gas is represented by the height of the short annular column of water through which it has to pass in bubbles—this being equal to the depth at which the lower edge of the sides of the cap is set below the upper edge of the ledge.

Alternatively, as shown in fig. 2, the gas may flow upwards and meet the down-flowing water. In this case, the lower edge of the sides H of the cap G and upper edge of the ledge E are placed at the same level; and the pressure in this case being greater beneath the shelf than above, the water around the sides of the cap stands at a higher level than the lower edge of the sides of the cap, and upwards through this water the gas will be required to bubble. This inversion of flow has the merit, the patentee points out, that the head of water automatically accommodates itself to the difference of pressure available in the gas. It has the further advantage that, in its progress, the gas successively meets purer water; and, in the case of the purification of heated gases, the final contact is with water which is at the lowest temperature as well as being in the purest condition.

In order to provide for the diminishing volume of the gases as they become cooled, the diameter of the apertures F is made successively smaller in relation to the direction of flow of the gases—that is to say, the top aperture is the largest when the gases are caused to flow downwards, and the bottom aperture is largest when the gases flow upwards.

The water, in overflowing the ledge of a shelf, falls through the chamber beneath it in the form of a screen of drops of water, and thus makes further contact with the gas contained therein; and the gas which flows upwards has to pass through such a screen to reach the aperture above.

The top of the purifier is enclosed by a domed cover provided with a funnel for the water; the lower end of the funnel being connected with a pipe M surrounded by another pipe N (thus forming a water seal). By this means the escape of gas and the admission of air is prevented, while the admission of water is permitted.

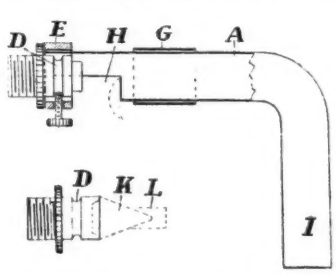
In the bottom scrubber compartment a pipe O is fitted, the upper end of which is connected to the aperture F in the lowest shelf D. The lower edge of this pipe is immersed in water contained in the bottom compartment; a ledge E being provided for maintaining the level of the water at a constant predetermined height above the lower edge of the pipe O in the case in which the gas flows downwards, and in the case in which the gas flows upwards the level of the water in the bottom compartment is kept coincident with the lower edge of the pipe. In this latter case, the water descending through the pipe is ponded-back to an amount equivalent to the difference of pressure. An outlet P is provided for drawing off the fouled water through a pipe which is water sealed to prevent the escape of gas. Before its final exit, the gas is led through a mass of fibrous material Q for the purpose of removing any excess of moisture.

Burners for Incandescent Gas-Lamps.

PÖSCHL, A., of Berlin.

No. 1074; Jan. 16, 1908.

This invention relates to inverted incandescent gas-burners in which the mixing-tube is arranged horizontal at first and then bent vertically downwards—the burner being characterized by the suction chamber,



Poschl's Incandescent Lamp-Burners.

which is directed downwards only; being made by cutting away the mixing-tube up to half its diameter, "for the purpose of avoiding noises by gas and air entering into the mixing-tube."

The body of the nozzle has a groove D in which the screw of a ring E engages, by means of which the mixing-tube A is attached to the body of the nozzle, and can be adjusted with its arm I exactly vertical. The mixing-tube is provided for the admission of air with an incision H extending over half the cross-section; the arrangement being such that the incision which forms the suction chamber is directed vertically downwards. A tube or sleeve G may be provided for throttling the air. Hitherto mixing-tubes have had only one round stamped hole, behind which was a pointed nozzle, which were "the cause of too much noise." In order to avoid this, one half of the mixing-tube is first cut away "so that sides of the tube lower than the centre which could vibrate are done away with." Further, a flat nozzle, with one or more orifices, is preferably employed, which "does not give rise to oscillations."

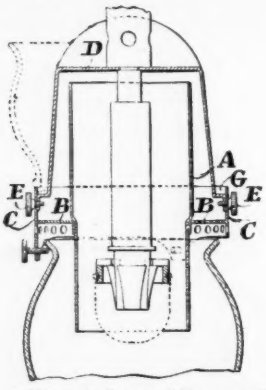
These orifices of the nozzle may also be preferably arranged on a sunk surface N. A pointed nozzle K is only then able to be employed without producing noise when a chamber for reducing the pressure of the gas is provided on it—for example, by means of an additional tube L.

Inverted Regenerative Incandescent Gas-Lamps.

ZECHNALL, L., of Bunhill Row, E.C., and ALTMAN, J., of Commercial Street, E.

No. 1844; Jan. 27, 1908.

This gas-lamp is of the type where the upper part of the burner is cut off from the lower part by a partition around the chimney in which is the nozzle of the burner, and which extends both below and above the partition. In such burners as hitherto constructed, the depending part of the chimney terminated at or about the burner-nozzle and did not enclose the mantle; and the inflowing air entered the base of the chimney without being compelled to pass over the lower parts of the mantle. The present type of lamp allows of the diameter of the enclosing globe being reduced to about twice the length of the mantle. The chimney depends from the partition for a length sufficient to cover the nozzle; and the major part of the mantle and the chimney is also carried upwards beyond the partition for a length at least two-thirds of the length of the depending part.



Zechnall and Altman's Inverted Regenerative Lamp.

A is the chimney, which is carried up beyond the partition B for a considerable distance; the upper part or extension being of a length at least two-thirds of the lower part depending from the partition. The lower part is of slightly less diameter than the upper part, so as to form a shoulder by which the chimney is supported by the partition. Further, the partition is carried by (or forms part of) a gallery C detachably suspended from a bridge-piece D passing over the top of the chimney by arms or extensions which pass down each side. The upper part of the bridge-piece may be formed with side wings or deflecting plates for protecting the upper part of the burner from the heat. The depending arms of the bridge-piece are connected to the gallery by a detachable joint—for instance, as shown, the ends may be bent into a Z form so as to provide a gap between it and the inner surface of the gallery, so that a globe or shade (shown dotted) may be supported, if required, to enclose the upper part of the burner.

The part of the gallery beneath the partition is perforated to permit access of air, and is also provided with means for supporting the lower globe which (as usual) encloses the burner and downwardly projecting part of the chimney. In use, the air passes through the apertures in the gallery and down on the outside of the lower part of the chimney, and then upwards through the chimney. The inflowing air is thus not only caused to enter the chimney near the bottom of the mantle, but gives a considerable height to the chimney as a whole—particularly the portion above the burner and above the partition. A greatly increased draught is obtained in this way and "a better supply of air to the burner and increased light."

Filaments for Incandescent Gas-Mantles.

LAIGLE, R., of Paris.

Nos. 3785 and 9622; Feb. 19 and May 4, 1908.

This invention relates to the production of infusible and indestructible gas mantle filaments obtained by mixing certain oxides of the rare earths—such as those of thorium, cerium, and the like—with another more fusible oxide; and it consists in heating the filaments to, or slightly above, the melting point of the more fusible oxide, which, in the present case, acts as a binder—viz., berylla.

The filament is obtained by forming a paste rendered plastic by the incorporation of the active principle of an agglutinant gum, which allows of a filament being easily made by means of a draw plate (in the usual manner); the filament being subsequently heated to the temperature of the melting point of the binding oxide.

As an example, the patentee gives the following percentage composition:—

Alumina precipitated by ammonia	3·0
Berylla	2·0
Silica or silicate of alumina	1·0
Oxide of thorium	92·8
Oxide of cerium	1·2

The heating of the filament requires an apparatus by which an elevated and regular temperature can be obtained; and for this purpose a reversed oxy-hydrogen blow pipe may be employed, "which enables the filament to be very regularly heated for a great length of time—such regularity being necessary in order to avoid any ulterior deformation."

It is preferable to use as a binder the metallic oxides that have a melting point not above that of beryllium oxide; and it is preferred to use the latter oxide itself. It is necessary, however, that the temperature to which the filament is exposed while it is calcined should correspond to, or be only slightly higher than, the melting point of the binder used, so as to prevent the filament from becoming vitrified in consequence of the temperature attained being too high.

The beryllium oxide must be present in sufficient quantity to be capable of binding together the particles of the other materials without entirely surrounding them. In using the filament, the burning gases must be able to obtain access to the light-giving oxide so as to allow of maximum catalytic reaction. A certain quantity of the binder must, therefore, be used, which may only be varied to a slight extent. When the process of calcining takes place, the phenomenon of capillary attraction is produced, and the binder is accumulated at the points of contact of the particles; the quantity of the binder being such that these particles are held together without being "engulfed or swallowed up." In this manner, a filament is obtained that is porous as well as strong; the porous quality being necessary in order to obtain the maximum amount of light. The oxides of thorium and cerium are cemented together in the filament without the gases being prevented from reaching them.

In order to transform into a filament the paste prepared with the bodies referred to, it is necessary that the paste be made to pass smoothly out of the press. Various means have already been employed for this purpose; but on calcining the filaments obtained thereby, these means left a residue behind that was "obnoxious." This drawback may be avoided by using a soap—such as ammonium oleate in a perfectly pure state—so that after the process of calcination no trace of it is left (its components being entirely volatile). For the same reason it is necessary to use an agglutinant that is entirely decomposed by heat into volatile products. For this purpose, gum arabic that has been freed entirely from its mineral impurities may be used. Nevertheless, it is difficult to avoid the formation of carbon that remains as a residue after decomposition of the organic material used as an agglutinant. In order to be sure of removing these traces of carbon, an organic oxidizing material is incorporated in the plastic mass in sufficient quantity to complete the combustion of the carbon and thus entirely remove it.

APPLICATIONS FOR LETTERS PATENT.

11,851.—SEMPER, M. G., "Gas-kilns." June 1.
11,868.—SCHEURMANN, W., "Compressors." June 1.
11,911.—BRACKENBURY, H. I., "Valves." June 1.
11,929.—KILLIE, J. M., "Purifying producer gas." June 2.
11,942.—DUNPHY, A. L., and TYSOE, J., "Inverted incandescent burners." June 2.
11,980.—BOOTH, G., "Preventing escape of gas." June 2.
12,026.—MERIVALE, C. H., and GREGGORY, P., "Vertical gas-cooler placed immediately above each oven or retort of any battery to cool the gas and allow the condensate to fall back into the oven or retort when desired." June 3.
12,038.—BODE, J., "Number of doors grouped and revolving around a heating and lighting apparatus in such a way that the benefit of the latter is automatically directed into that room which one happens to occupy." June 3.
12,048.—ROGERS, A., "Atmospheric burners." June 3.
12,069.—HUTCHINS, T. W. S., "Gas-producers." June 3.
12,070.—WOODALL, H. W., and DUCKHAM, A. M'D., "Discharging vertical or substantially vertical retorts." June 3.
12,111.—GREAVES, W., "Gas-engines." June 4.
12,113.—HOLGATE, C. S., "Producers for water gas and producer gas." June 4.
12,146.—NOAD, A. C., "Incandescent lamps." June 4.
12,154.—HENDRICHS, E., "Reflector." June 4.
12,193.—HANDS, G., "Inverted burners." June 5.
12,278.—BOOTH, J., and SIMPSON, R. J., "Gas-fittings." June 5.
12,281.—TANGYES, LTD., and ROBSON, M., "Gas-producers." June 6.
12,318.—LUBER, A., "Inverted lanterns." June 6.
12,330.—LYCETT, E., "Economizing gas." June 6.
12,331.—KLAUSER, H. O., "Inverted incandescent gas-lamp." A communication from the Automatic Screw Works. June 6.
12,345.—MAYNARD, G., and VENESS, G. T., "Gas-stoves." June 6.

Brighton Water Supply.—The statistical returns connected with the Brighton Corporation Water-Works are of a satisfactory character. Though the balance of debt to be provided for is £726,788, the annual charge upon which is £35,870, in 31 years the undertaking has contributed to the rates the sum of £173,512.

Suicide by Gas.—Annie Thornton, a single woman living at Hull, was found dead in her kitchen. The gas-taps to the boiling-ring and the jet were open; but as a penny-in-the-slot meter was used, there was no smell to be detected. The medical evidence at the inquest, however, was to the effect that death was due to coal gas. On the mantelpiece was discovered a pawnticket relating to a machine, and also a short note, on which was written: "I have had a hard life; I am tired of it all, Will you get the machine? It will help the rent." By the side of the pawnticket was a two-shilling piece.

Gas Plant and all constructional Steel and Iron Work.

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CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Balloon Filling Extraordinary.

SIR,—I must congratulate you upon the lucid manner in which the various details are set out in the interesting and instructive article on the above subject in your issue for June 2. It is well to have such a record for future guidance.

The broad fact is that some two million cubic feet of coal gas were passed through about a mile of 12-inch main at 60 to 66 inches pressure, and in eight hours successfully inflated 31 balloons simultaneously. The gas engineers therefore deserve every credit for the accomplishment of their work.

I suggest, as a result of the experience, that the work could have been done just as well without duplicating the pipes overground. If the 12-inch main had been connected up to the centre of the 18-inch "float" with its thirty-one 3-inch outlets, it would have answered every purpose, have saved the expense of some 100 yards of 12-inch pipes, bends, and diminishing pieces, and have avoided the obstruction to the balloon hosepipes caused by the second pipe.

The valve at each outlet would enable each aëronaut to control the flow of gas to his balloon, which is, of course, desirable, although I must say the instance given in your article—of the need of a preliminary rush of gas to raise the balloon valve evenly—is far-fetched. The gas always appears to come faster at first, owing to the small capacity of the top of the balloon as compared with that at its equator, and there is never any difficulty on this score.

One point which has not been referred to is also worthy of consideration—namely, the inordinate amount of black dust which came through the pipes with the gas and badly soiled every new balloon, so that its appearance was completely ruined and its value correspondingly depreciated. Whether this was merely rust out of the pipes, which could have been prevented by carefully cleaning before laying, or whether it was a deposit from the gas caused by the high pressure, I am not sure; but I hope it can be prevented in future.

PERCIVAL SPENCER, Aëronaut.

Highbury, N., June 9, 1908.

Testing Burners.

SIR,—It is to be hoped that one day we may all be working with a common standard burner. Meanwhile, may I be allowed to point out that, until that day arrives, those undertakings for whom a 15-hole burner is prescribed, and who can take advantage of the recent decision in the Brentford case, may find it convenient to use an adaptation of the No. 2 "Metropolitan" argand, which has been modified for the purpose, by being provided with 15 holes instead of 24?

CHARLES CARPENTER.

June 10, 1908.

Testing Privileges of Brentford.

SIR,—Referring to the "Editorial" in this week's issue of the "JOURNAL" on the Brentford case, may I be allowed to point out that all gas undertakings that must comply with a testing clause such that "an argand burner having 15 holes and a 7-inch chimney, and consuming 5 cubic feet of gas an hour" must be used, will find it to their advantage to employ the "Parliamentary" argand, which has been specially constructed to meet this special enactment, and at the same time develop "the greatest amount of light" from any and all kinds of illuminating gas.

The quantity of air for the proper combustion of the gas is, and can be, so regulated that every portion of the flame receives only that which is requisite to the full development of light and not heat. This is the standard which should be aimed at (and is sadly needed), and is one of far greater importance than a uniform burner for common gas supplied to the public to-day, unless, of course, the burner can be depended on to develop "the greatest amount of light" from the gas consumed.

W. GRAFTON.

East Ham, June 13, 1908.

The Nuneaton Gas Company and its Affairs.

SIR,—Referring to the questions raised in my letter of the 28th of April (*ante*, p. 298), and which I should have liked discussed further in your columns, I have received several letters privately on the subject, so that some result has been achieved from the generous publicity your correspondence columns have afforded. "Clean Gas" (*ante*, p. 445) stated a case very much to the point; and I shall hope yet to see his further contributions.

With regard to myself and Mr. North, there is no reply to my letter in your issue of the 19th of May; and I therefore proclaim the fact and its teaching. In the further letter he sent you, he avoids all the issues he previously raised, and attempts to drag in other outside questions for which he possesses just as little knowledge or authority as he did for the statements he made previously. His methods are as transparent as are his objects. One door was open for Mr. North to retire from this controversy with some honour. I regret he did not use it.

GEO. HELPS.

Nuneaton, June 8, 1908.

Damage Done to Public Lamps by Vehicles.

SIR,—Your "Editorial Note," in the current issue of the "JOURNAL," regarding the decision of Mr. Justice Ridley and a Special Jury as to the non-liability of the owners of vehicles for damage done by their motor 'buses to the lighting plant on the streets, will surely interest many of your readers.

In all the larger cities, the damage done by all classes of vehicles is enormous, and runs to hundreds of pounds a year. The plea that negligence must be proved is wide in its scope; and a definition of the term "negligence" would be appreciated—perhaps I should say a "legal finding" as to what the term covers. In the Burgh Police (Scotland) Act, 1892, local lighting authorities are given power to recover, by summary procedure in the police court, the cost of any lamp broken (either through negligence or accident). This Act applies to the smaller burghs in Scotland, as the larger burghs as a rule have Police Acts of their own in which, unfortunately, this power is not given.

How do these accidents happen? In some cases by lorries or floats being overloaded, and the goods allowed to project over the edge of the lorry or float. I may say that the practice in the place in which I am interested is to keep the lamp-pillar shaft back from the kerb of the pavement at least 10 inches. This distance is double the depth of the hub of a wheel.

As many of the owners of vehicles insure against this class of risk, and the arguments with insurance companies are numerous, some other expressions of opinion on the whole question of damage to lighting plant in streets would be interesting to many of us. Meantime, I shall await with interest the result of the appeal against Mr. Justice Ridley's decision.

LIGHTING.

June 11, 1908.

Sulphate Saturators.

SIR,—Referring to Mr. Williams's letter in your issue for June 2 I made no statement or claim in my specification as to the thickness of the wall of the saturator, nor did I say what strength the orifices which convey the ammonia gases into the saturator should be, as this could only be ascertained by experience. That the better distribution of the ammonia gases by perforating the wall of the saturator at intervals was in my mind, is clearly shown by my specification. This is the principle; and if this method is no better than what existed before, why is Mr. Williams so anxious to claim the invention?

Mr. Williams says: "Surely he is going to allow us to perforate the walls of the saturator somewhere." If Mr. Williams is going to do this, for the same purpose as, and practically in a similar manner to, that covered by my patent, he must first obtain a permit from me for so doing. As this matter will probably be thrashed out elsewhere, I will leave it for the present.

GEORGE PETTIGREW.

Thornaby, June 6, 1908.

LEGAL INTELLIGENCE.

LIABILITY FOR PAYING THE "KING'S CLOGG."

In the Chancery Division of the High Court of Justice, Mr. Justice Warrington was occupied several days recently in hearing an action brought by Sir Frederick Edward Shafto Adair against the New River Company and the Metropolitan Water Board to ascertain his rights with reference to a yearly payment—known as the "King's Clogg," of £400, which for many years had been made to him and his predecessors in title by the New River Company.

Mr. ROWDEN, K.C., and Mr. TOMLIN appeared for the plaintiff; Sir R. FINLAY, K.C., Mr. BUCKMASTER, K.C., and Mr. SARGANT for the New River Company; and Mr. DANCKWERTS, K.C., and Mr. A. B. SHAW for the Metropolitan Water Board.

Mr. ROWDEN said that when in the reign of James the First, Sir Hugh Myddelton brought from Hertfordshire into London the streams which formed the New River, he had the co-operation of the King, for which he received a moiety of the profits of the undertaking, known as the "King's Moiety," the other moiety going to the Adventurers. The next Sovereign, Charles the First, conveyed his moiety to Sir Hugh Myddelton in consideration for the annual payment of £400—since known as the "King's Clogg"—which was charged on 29 King's shares and two Adventurers' shares. From its creation until 1905, this charge had always been paid yearly by the New River Company to the plaintiff and his predecessors in title. The history of the "Clogg" was shortly this: By letters patent under the Great Seal, dated June 21, 1619, Sir Hugh Myddelton and 28 other Adventurers were incorporated as the New River Company, and the letters patent provided that the net profits of the undertaking should be paid as to the King's moiety to the King, his heirs and successors, and as to the other moiety to the Adventurers, according to their several shares and interests, and that the Adventurers' moiety should be divided into 36 equal parts. On May 12, 1698, the "Clogg" was assigned by William the Third to one Dennis Cooling, and afterwards it became vested in William Adair, from whom the plaintiff derived his title. After the New River Company had been absorbed by the Metropolitan Water Board, they declined to pay the £400; alleging that the liability had been transferred to the Board. It was repudiated by that body; and the question to be decided was who was responsible for the payment. Counsel then at some length proceeded to trace the title of the plaintiff, which was rendered the more difficult by various documents having been destroyed by fire in 1769, when the offices of the Company were burnt. By the Royal Charter, the undertaking was vested in the Corporation. But the latter held it in trust for the shareholders as tenants in common; and the shares having been taken over by the Water Board, the Board were bound to discharge any liability attaching to them.

Justice WARRINGTON, in giving judgment, said by the Charter of 1619, the Treasurer of the New River Company had to pay to the King one half part of the "clear gains and profits" of the undertaking, after deducting the necessary charges and expenses; and the Company became entitled to these profits in trust as to one moiety for the King, and as to the other moiety for the shareholders. It being thought inconvenient that the King should himself personally receive his moiety, he executed a deed on Oct. 28, 1619, whereby he transferred it to

certain Trustees. So things continued until 1631, when Charles the Second transferred the King's moiety to Sir Hugh Myddelton, and took from him a charge upon the subject-matter. Whether this was a legal rent or a rent charge was of no importance; the King obtained a charge of some nature or other in perpetuity, which he transferred to Sir Hugh Myddelton. The New River Company were parties to this deed, and so became Trustees for Sir Hugh Myddelton, and came under the same obligation to pay the share of profits to him as they were previously under to pay it to the King. By this deed the "Clogg" was created; and it had been suggested that it was nothing more than a personal covenant on the part of Sir Hugh Myddelton to pay the annual sum of £400 to the King. But he (his Lordship) could not so regard it for a moment. It was the creation of a perpetual charge issuing out of that moiety of the Adventurers which by the terms of the Charter and the deed was then payable to Sir Hugh Myddelton; and the Company, being a party to the deed, became as much liable to pay the charge to the King as they were to pay to Sir Hugh Myddelton the moiety of the profits. King William the Third assigned the "Clogg" to Dennis Cooling; and it afterwards passed to the plaintiff's predecessor in title. From first to last, it had been regarded as a sum of money charged upon, and payable out of, the King's moiety of the profits of the undertaking. Its owner was entitled to look, and did look, to the Company to pay it; and from 1787 the half-yearly payments were made by warrant of the Company—the owner giving a receipt for money due upon, for, or from certain shares. It had been argued that the Court must infer an agreement on the part of the owner of the rent charge to give up the obligation, and to look to the owner of the shares to pay the "Clogg." In his opinion, all the Adairs had to do was to look to the Company, as Trustees, for payment; and there was no ground for presuming any alteration of the legal rights of the parties which were created by the deed of 1631. Then arose the question of what was the effect of the passing of the Metropolis Water Act of 1902. Had it provided for compensation in respect of the "Clogg" in the shape of water stock which was given to the shareholders, or had it left it as an obligation to be performed by the Metropolitan Water Board out of the water fund? The Act provided that, as from the "appointed day," the undertaking of each of the Metropolitan Water Companies should be transferred and vested in the Board, and that there should be transferred from each Company to the Board all liability with respect to all debts, liabilities, and obligations then existing. The obligation of the Company to pay the annual sum out of the moiety of profits was transferred to the Water Board; and by section 4 the security was transferred from the income of the Company to the water fund. The result was that he must make a declaration that the "King's Clogg" of £400 a year was, according to the true construction of the Act of 1902, an obligation which was transferred, and was now an obligation on the Board, and that the annual sum was secured upon the water fund established by that Act. There would also be an order for payment by the Board of the annual sum, and the arrears thereof, with interest, out of the fund. The costs of the plaintiff and of the New River Company must be paid by the Board.

AN IRISH FACTORY ACT PROSECUTION.

At the recent Coleraine Petty Sessions—before Mr. Patrick M'Gilligan, Chairman, and a Bench of Magistrates—Miss Hilda Martindale, H.M. Inspector of Factories, summoned Messrs. R. H. & S. Rogers, Limited, of the Coleraine Shirt and Collar Factory, for failing to take adequate measures for securing and maintaining a reasonable temperature in a room in which certain persons were employed, so as not to interfere with the purity of the air of such room. Miss Martindale conducted the case for the prosecution; and Dr. H. A. Anderson appeared for the defence.

In opening the case, Miss Martindale explained that the proceedings were taken under section 6 of the Factory Act of 1901. The defendants employed a large number of women and girls; and in spite of repeated instructions the section referred to had not been complied with. On March 6, her colleague visited the factory, and not only made a note of the temperatures of the rooms, but also took samples of the air, an analysis of which showed that the requirements of the Act were not being complied with. In the North of Ireland, where large numbers fell into consumption, it was their special duty to ensure that women and girls were not employed in a room full of impure air, for everyone knew that half of the cases of consumption could be avoided by means of pure air.

The first witness called was Miss Whitworth, an Inspector of Factories, who said she visited the workrooms at 8.30 a.m. on March 6 for the special purpose of seeing whether Miss Martindale's instructions had been carried out. Before going there, she took the temperature of the outside air of Coleraine, which was 37°. She went to the top room of the factory, where she found over fifty women and girls employed; and the temperature was 49°. She noticed that the windows were all closed, and found there was no means of heating the room, such as hot-water pipes. There were 17 incandescent gas-lights, one ordinary flat-flame burner, and four gas-irons in the room. She re-visited the factory at 12.15 for the purpose of taking samples of the air, and then found the temperature 61°. This she attributed to the respiration of the workers and the gas rising from the irons. The content of the room was 34,445 cubic feet. She considered that the respiration of the workers and the gas produced would vitiate the air. She took samples of the air according to the prescribed methods, and, acting on instructions, forwarded them to the Home Office.

Cross-examined by Dr. Anderson, witness admitted that there were ten patent ventilators and one roof ventilator in the room. The workers numbered 68; and there was 506 cubic feet of air space for each person in the room. The minimum insisted upon by the Government was 250 cubic feet in the winter time. About 60° was quite a reasonable temperature for a room. She did not know that her predecessors had made no complaints. The Derry Justices had decided in another case that a temperature of 46° at 9.15 a.m. was a reasonable one. The morning she visited Coleraine was a damp, clammy one; and wet was coming into the room. Asked if she knew that the Government regulation stated that 55° was a reasonable temperature, witness replied that the Home Office did not specify any temperature. Dr. Anderson said it was not statutory; but there was a letter issued by the Home Office in July, 1906, in which the opinion was stated that 55° was reasonable.

Mr. W. J. A. Butterfield said he was retained by the Home Office to analyze samples of air. He did so in the case of this factory, and found that one sample contained 25·6 volumes of carbonic acid per 10,000 volumes of air; while a sample taken on the other side of the room contained 23·4 volumes of carbonic acid per 10,000 volumes of air. This was due partly to the breath of the workers, and partly to the gas-burners used for heating the room and to the gas employed for the irons. To allow of efficient ventilation of the room, about three times as much heat should have been supplied. If gas was used as a means of heating the room, the products of combustion should have been conveyed outside. If the factory was adequately ventilated, the heat of the burners used for lighting purposes would not seriously increase the temperature. The proportion of carbonic acid in the samples of air he tested was unusually high when compared with those taken at other factories.

Dr. T. M. Legge, Medical Inspector of the Factory Department of the Home Office, said he was of opinion that a reasonable temperature in the upper room containing seventy workers would be 60°. Under the Cotton and Cloth Act, it was definitely laid down that the amount of carbonic acid in the air should not exceed 9 parts in 10,000. He visited the factory on the 1st inst., and found the room in question was large, airy, and had all the means of ventilation. There was nothing to complain of on the occasion of his visit—a warm day.

A large amount of local evidence was then given as to the health of the girls employed in the factory. Dr. Forsythe said a number of them were anæmic, and a few had phthisis. Dr. Morrison also stated that the health of the majority of the girls working there was very bad. Both witnesses said they would regard 60° as a reasonable temperature. Mrs. Shirley said two of her daughters died of consumption; and both had been engaged at the factory. A third daughter became ill, and was taken away from there and sent to service, after which she improved in health. It was true the girls belonged to the Salvation Army, and often stood at wet and cold corners of the streets.

The last witness for the prosecution was Professor Simmons, who remarked that he had never been to the factory, and knew nothing about it. What he had to say depended on the particulars supplied to him. In his opinion, the use of gas in factory rooms as a means of heating was quite a bad thing; and the heating was defective. The percentage of carbonic acid gas present in the air was excessive in such rooms; and the gas was deleterious to health. Imperfect ventilation was a most potent factor in the spread of tuberculosis. In any factory room 12 parts of carbonic acid per 10,000 was excessive.

In opening the defence, Dr. Anderson submitted that the factory was well built, well ventilated, and well conducted, and that a reasonable temperature had been maintained. The girls in the factory had never made any complaints, nor said anything about discomfort, but as a matter of fact admitted that they were well looked after by their employers. The Derry Magistrates thought that 46° was a reasonable temperature. Dr. Legge and others regarded 60° as reasonable; and he (Dr. Anderson) thought the Magistrates, on their knowledge of the healthy, well-clad, and comfortable condition of the girls of the Coleraine factory, would find that 49° or 50° was a reasonable temperature. From 1901 to 1906, the Government inspectors were visiting the factory, when the ventilation was quite the same; and there were no complaints. Sir Robert Rogers would tell them that in one of his factories in England he had the place heated with steam-pipes; and this was found so unsatisfactory that he was obliged to start a system of gas heating. Miss Martindale, though asked for a suggestion in this case, had never offered one.

Evidence was then called. Mr. T. Galbraith, the Sub-Manager at the factory, said there were seven windows in the room in question and twelve ventilators. He had had no complaints from any of the girls. Sir Robert H. Rogers, the Chairman of defendant Company, said he had built and equipped altogether seven factories; and he laid out the one at Coleraine to the best of his judgment as regarded construction and ventilation. He considered the ventilation in the top room was sufficient. The gas was lighted on winter mornings about half-an-hour before the girls arrived, so as to get a proper temperature. They started with a temperature of 45° or 50°; and as the day advanced and the outside temperature increased, they turned out the gas. His opinion was that this was the most convenient arrangement, as it was the most easily governable. He had never heard, when visiting the factory, any complaints from the girls. If efficiency were obtained, he would not mind the expense of putting in a heating apparatus. They could get a more even temperature when heating by gas than with hot-water pipes. In cross-examination, witness said he was not aware that in the majority of factories some method of heating such as hot-water pipes was provided.

The Magistrates then retired to consider their decision; and on returning into Court, the Chairman said that the majority of the Bench found that the factory had not been heated in conformity with the Act, and that adequate means must be taken for securing and maintaining a reasonable temperature which would not interfere with the purity of the air. A fine of £1 would be imposed, with £5 costs.

Messrs. Joseph Taylor and Co., of Bolton, have in hand repeat orders for their latest make of solid-plate lead saturators, fitted with double detachable ammonia-pipes, detachable steam-pipe, and detachable acid-pipe arrangement, for the Colne Corporation, the Darwen Corporation, the Gloucester Gas Company, and the Tottenham and Edmonton Gas Company. They have also in hand a repeat order for the Earl of Ellesmere for a circular plate lead self-emptying saturator; the body and cone being made from one plate. Further orders have been received from the Barking Gas Company, the Inverness Corporation, the Seaham Harbour Gas Company, the Lisburn Gas Company, as well as a repeat order from the Portadown Gas Company.

MISCELLANEOUS NEWS.

ANOTHER REDUCTION AT WIDNES.

The following extract from the minutes of the Gas and Water Committee was responsible for a lengthy discussion at the meeting of the Widnes Town Council last Tuesday.

The Engineer (Mr. Isaac Carr) submitted particulars of the workings of the Gas and Water Departments for the year 1907-8, showing net profits on the gas undertaking of £4017 13s. 11d., and on the water undertaking of £18 0s. 11d. Resolved that on and after the 1st of July prox. the price of gas be reduced as follows:—

Ordinary consumers inside the borough:—

To consumers of 3,000,000 cubic feet and upwards per annum, from 1s. 1d. to 1s. per 1000 cubic feet net.

To consumers of under 3,000,000 cubic feet per annum, from 1s. 3d. to 1s. 2d. per 1000 cubic feet net.

To consumers for motive power purposes, from 11d. to 10d. per 1000 cubic feet net.

The term "net" as mentioned above means payment within one month from the end of the preceding quarter; otherwise the price is increased by 2d. per 1000 cubic feet.

Slot consumers inside the borough:—

From 44 cubic feet to 50 cubic feet for 1d.

In moving the adoption of the recommendations, Alderman H. S. Timmis, the Chairman of the Committee, said the profit on water, of £18, was a very small amount; but considering that during the past twelve months they had had to meet rather extraordinary expenditure, it was not bad. There had been an increase in the cost of fuel of £324, as compared with the previous year; and they expected to save this amount during the coming year. The building of a costly engine at Stocks Well had entailed a heavy call upon their financial resources, involving a charge upon the sinking fund of over £200. They had also to get a fuel economizer for Netherley, making a total of £726 as extraordinary expenditure. Twelve months ago he told them that the price of coal was going up considerably, and that though other gas-works had put up the price, they in Widnes did not anticipate being compelled to do so. It was therefore gratifying to find that at the end of the year, without raising the price, they had made a profit of £4000. The question arose, What was to be done with it? They allocated £2000 towards the public lighting, which left another £2000 to carry forward. They also assumed that they would save a sum of £3000 in the cost of fuel—the amount by which their coal bill had been increased. This would make the estimated profits next year £7000. By the reductions as set forth in the minutes, there would be a loss of revenue to the Gas Department of some £2000. It had been said that the slot-meter consumer was the man who made the profits. As a matter of fact, he was rather costly to the Committee; but their desire was to give him all the benefit they could. They therefore arranged for him to have 50 feet for his penny, whereas no other body in the country supplied the slot-meter consumer with more than 35 feet. The supplying of the slot-meter consumer with 50 feet meant that he returned less to the Corporation in the way of profit than the ordinary consumer. There would doubtless be some who would say that the reduction was made in the interests of the manufacturers. There were 73 gas-engines in the town; and of these, 50 belonged to tradesmen. Therefore the reduction of 1d. to the power consumer was not one entirely for the benefit of the large consumer. The largest consumer of gas for power purposes was the Corporation—in other words, the Widnes and Runcorn Transporter Bridge. The Corporation held the largest number of shares in the bridge; and a reduction in the gas used there meant a benefit to them. When the Committee were able to show a profit of £4000 after having to meet the extra cost of coal to the amount of £3000, it certainly could not be said that the policy which directed the Committee to recommend the decreases in price was not a sound one.

The motion having been formally seconded, Mr. Davies asked if the Chairman of the Committee would take back the recommendations for a month—giving as a reason that there were a number of figures which the Council should have before them to enable them to come to a right decision. The abstract of accounts had not yet been published. Alderman Timmis replied that for sixteen years the figures relating to the gas and water undertakings had been presented to the Council at their first meeting in June; and they had been accepted, with any reductions which had to be proposed, and without requests for figures, abstract of accounts, or anything of the sort. The net cost of manufacture of gas and maintenance per 1000 cubic feet was 6·46d. The net cost of manufacture and distribution per 1000 cubic feet, including all charges, was 12·59d., as against 11·38d. last year. The question of altering the meters was at present under consideration. If they were altered, it would mean great expense; but he thought the majority of the people would rather meet this expense than not have the reduction. The amount of gas consumed by ordinary customers was 267,690,000 cubic feet; and slot-meter consumers were responsible for 74,460,000 cubic feet, or about one-fifth of the total. The total amount of gas consumed in the works of the town was 45,460,000 cubic feet, of which 27,500,000 feet, or 60 per cent. of the consumption, was used for motive power. The fifty tradesmen who had engines used 8,800,000 cubic feet; 5,757,000 feet being used for motive power. These tradesmen used more gas for motive power in proportion to their consumption than the works. The Transporter Bridge used 4,400,000 cubic feet, all for motive power.

Mr. Welding pointed out that it had been stated by the Chairman that it cost 1s. 0½d. to make 1000 cubic feet of gas, yet it was proposed to reduce the price to motive power consumers from 11d. to 10d., and to reduce it to consumers of 3,000,000 cubic feet from 1s. 1d. to 1s. He proposed that these two items be struck out, on the ground that they would be selling gas at a price lower than it cost to make it. Alderman Neil said that if Mr. Welding would alter his amendment to read that consideration of the two items he had mentioned be adjourned to the next Council meeting, he would second it. Mr. Welding said that he preferred this course. He only desired to ask the Chairman some questions. He moved that further consideration of the recommendations be adjourned. Alderman Neil seconded, and said he was thoroughly alive to the advantages which ought to be given to the manufacturers; but he did not think it was a good arrangement to sell gas at below cost price. As an alternative to the recommendations, he suggested that the Committee should consider a reduction in the hire of meters or the advisability of doing away with meter-rents altogether. Mr. Clarke did not think any good purpose would be served by adjourning the consideration of the matter, and pointed out that the policy of giving a reduction to the consumers was followed almost yearly. Widnes was not alone in the matter of selling gas to large consumers below cost price. The Sheffield Gas Company, who ran a good second to Widnes in selling cheap gas, and which was one of the most profitable and best managed companies in the country, produced gas at a cost of 1s. 3·31d. per 1000 cubic feet, and sold at 1s. 4d. and 1s. 2d. for lighting, and 1s. for motive power. Complaints were being made that the tradesmen of Widnes were hardly treated in various ways, and they therefore had a right to consideration. The Gas Committee's policy was supported by the illustration that no tradesman made a profit on every article he sold. They had to strike an average, and do their best for the general public. That the Committee had encouraged slot-meter consumers was shown by the fact that they now took 74 million cubic feet.

At a later stage of the discussion, the Mayor remarked that it was a big subject, and it "seemed to generate heat." Alderman Timmis replied that he left the matter in the hands of the Council; but it was the first time that he had known people to cavil at something which was given them for nothing. Slot-meter consumers got a concession which was equivalent to a reduction of 2¾d. per 1000 cubic feet, or three times the reduction of anyone else. The question of selling at what was apparently below cost price was one which entered into all big businesses. Were they selling gas at a price below what it cost to manufacture, they would not have a profit of £4000 to show.

The amendment on being put to the meeting was lost; and Mr. Davies then moved, and Mr. Welding seconded, that the quantity of gas given to slot-meter consumers should be 55 cubic feet for 1d. This, however, was withdrawn; the Mayor expressing the opinion that there was every confidence in the Gas Committee, and that it was agreed the Committee thoroughly understood what they were doing. The only doubt was on the part of some members of the Council as to whether the future earnings were being equitably distributed. This seemed to be the *crux* of the whole position.

The minutes of the Committee were then adopted.

DEVONPORT CORPORATION GAS UNDERTAKING.

The Past Year's Working.

At a recent Meeting of the Gas Committee of the Devonport Corporation, the Gas Engineer and Manager (Mr. J. W. Buckley, Assoc.M.Inst.C.E.), submitted his annual report; and the Borough Treasurer (Mr. H. J. Hoare) produced the statement of accounts for the year ended the 31st of March last. The statements were considered very satisfactory, and the Committee passed a resolution congratulating the Chairman (Alderman W. Hornbrook) and the Engineer and Manager on the success which had attended the working of the undertaking.

Mr. Buckley's report showed that the total quantity of gas made during the year was 347,427,000 cubic feet—an increase of 4,541,000 cubic feet, or 1·32 per cent., over last year. Of the total make, 275,702,000 cubic feet were coal gas, and 71,725,000 cubic feet carburetted water gas; the proportions being 79·35 per cent. of the former and 20·65 per cent. of the latter. The maximum quantity of coal gas on any one day was 31·93 per cent. on the 8th of November. The bulk of coal carbonized was 26,040 tons—a decrease of 2033 tons compared with the year 1906-7; while oil, of which 185,832 gallons were used, showed an increase of 28,615 gallons, and coke and breeze (the total quantity utilized of which was 2218 tons) an increase of 525 tons. The gas made per ton of coal carbonized was 10,587 cubic feet. In the carburetted water-gas plant, 2·59 gallons of oil were used per 1000 cubic feet of gas produced. The make per ton of coal carbonized is a record for the works. In 1903, the average was 9811 cubic feet; and in the subsequent years 9910, 10,095, 9881, and 10,224 cubic feet. Mr. Buckley points out that the past year's figures (10,587 cubic feet) exceed those of 1906-7 by 363 cubic feet per ton. These results, he says, must be gratifying to all concerned, especially when it is known that similar coals have been carbonized, that the retort fittings and benches are antiquated, and that no new capital expenditure was incurred—that, in fact, there were no additional charges to revenue beyond repairs and maintenance. They certainly exceed his most sanguine anticipation. The maximum make of gas in 24 hours was on the 1st of January, the total being 1,454,000 cubic feet. The maximum demand was on Christmas Eve, when the consumption reached 1,521,000 cubic feet; the minimum being on the 5th of August, when only 471,000 cubic feet were required.

With regard to the sale of gas, the following table, showing the quantity sold during the year and the increase or decrease compared with 1907, is of interest:—

	Quantity sold. Cubic Feet.	Increase. Cubic Feet.	Decrease. Cubic Feet.
Private consumers	186,922,500	1,901,050	—
Government establishments .	36,305,000	—	16,153,600
Prepayment meters	91,527,500	18,696,925	—
Public lighting	21,900,800	577,300	—
Total	336,655,800	21,175,275	16,153,600

The proportion of gas sold was 96·9 per cent. of the actual make, which was 347,427,000 cubic feet, and as 0·9 per cent. was used on the works, the quantity unaccounted for was only 2·2 per cent. The total increased quantity of gas sold as compared with 1907 was 5,021,675 cubic feet, equal to 1·5 per cent., which, Mr. Buckley remarks, will doubtless be considered satisfactory when the enormous decrease in the gas sold

to the Government establishments is taken into account. During the year, 1438 new prepayment meters were fixed; bringing up the total to 8989. The average consumption through these meters last year was 10,182 cubic feet; and the average revenue per meter, £1 13s. 6d. The consumption shows an increase of 537 cubic feet per meter over the year 1906-7; and the averages compare favourably with other towns. There are 57 miles 593 yards of mains in the district. The ordinary consumers number 5958; and the total (14,947) gives an average of 260·7 consumers per mile of main, compared with 234·19 consumers last year. In 1903 there were 7923 consumers in all, or an average of 158·46 per mile of main. The whole of the public lamps, which number 1112, were converted to the incandescent system by September last. As to residuals, there was a decrease in the actual production last year, owing to the smaller quantity of coal carbonized since the introduction of water gas. The proportions per ton of coal carbonized were 13 cwt. of coke and breeze, 9·61 gallons of tar, and 20·71 lbs. of sulphate of ammonia. The make of sulphate exceeded that of the previous year by 0·04 lb. per ton of coal carbonized; and last year was a record of an increased production of about 50 per cent. upon that of the years 1903-5.

As to the works, Mr. Buckley indicates several minor improvements which have been carried out, and states that Messrs. Willey and Co. have now got well in hand the work of rebuilding the retort-house and coal-store, and the reconstruction and rearrangement of coal elevating and conveying machinery. He points out, however, that the alterations, improvements, and extensions which he enumerated in his previous report as necessary, if the works were to be up-to-date, still remain to be done. These include the provision of modern carbonizing plant, exhausting machinery, tar-extractor, scrubber and washer, governors, workshops, workmen's mess-rooms, &c., and alterations in the positions of the steam-boilers and the sulphate plant.

From Mr. Hoare's financial statement, it appears that the total capital expenditure on the undertaking now amounts to £301,031, which is equivalent to £894 per million feet of gas sold, £9 3s. 8d. per ton of coal carbonized, and £20 2s. 9d. per consumer. The revenue last year was: Sale of gas, £42,638; sale of coal, £657; rental of meters, stoves, and fittings, £5308; residual products, £12,569; rents, &c., £53—total, £61,425. As compared with the previous year, there was an increase of £2091 in the revenue; the income from sales of gas being 2·98 per cent. more. The expenditure amounted to £43,008; there being an increase of £2007 in the cost of the carbonizing material. There was a total increase of £3962 and a decrease of £994. The balance of £18,417 is the gross profit; and after payment of £17,683 for interest on, and redemption of, loans, there is a balance of £748 of net profit. Compared with 1906-7, the gross profit shows a decrease of £914, and the loan charges an increase of £526; the result being that the net profit is £1440 less than last year. Mr. Buckley's comment on this is as follows: "It may be well to mention that had the Gas Committee's recommendation regarding the increased price of gas been confirmed by the Council in December last, the net profit this year would have been almost identical with that of last year, which absolutely substantiates the figures I laid before the Committee on this question." The suggestion to increase the price of gas was made in view of the advance in the price of coal, but was rejected by a majority of the Council. In the first five months of the year, the coal received cost 13s. 3d. per ton; but in the latter part of the year it was 16s. 7d. Oil also rose ⅛d. per gallon. Mr. Buckley points out that the advance in coal is equivalent to 4d., and the increase in the price of oil to 1⅜d. per 1000 cubic feet of gas sold. The new contracts for coal have been entered into at 15s. 1d. and 14s. 10d. per ton, which, though more satisfactory than the present rate of 16s. 7d., marks an advance of 1s. 8½d. per ton over the price paid in 1906-7.

An analysis of the accounts shows that the revenue from gas was 2s. 6·396d. per 1000 cubic feet sold, compared with 2s. 5·965d. in 1907. The expenditure per 1000 cubic of gas sold worked out as follows:—

	1907-8.		1906-7.
Manufacture	1s. 11·910d.	..	1s. 10·083d.
Distribution	0 1·000	..	0 1·130
Maintenance of stoves	0 0·279	..	0 0·192
Public lamps	0 1·635	..	0 1·533
Rents, rates, and taxes	0 0·780	..	0 0·832
Management	0 1·129	..	0 1·088
Law charges, bad debts, &c.	0 0·184	..	0 0·265
Gross cost of gas	2s. 4·917d.	..	2s. 3·123d.
Less residuals	0 7·841	..	0 7·898
	1s. 9·076d.	..	1s. 7·225d.
Less meter-rents, &c.	0 3·810	..	0 3·250
Net cost of gas	1s. 5·266d.	..	1s. 3·975d.
Interest and redemption of loan	1 0·597	..	1 0·406
Surplus	0s. 0·533d.	..	0s. 1·584d.

Mr. Buckley concludes his report by pointing out that the increased production of gas and the increased yield of sulphate of ammonia per ton of coal, and the decrease in the leakage, are outstanding features of the year's working; and he says that each of these adds materially to the splendid financial result, and compares favourably with any works in the country operating under like conditions.

At the Meeting of the Town Council last Thursday, the Chairman of the Committee (Alderman Hornbrook) moved the adoption of the report and accounts. He said that, for purposes of comparison, he would take the year 1903—the first year of the municipal management of the gas undertaking. In that year the gross profit was £8000; while for the past year it was £18,000—a gain of £10,000. With regard to the consumption, notwithstanding the fact that the Government establishments had taken 22 million cubic feet less gas, this had been made up, and there was an increase of 68 millions as compared with 1903. At that time the leakage was 7 per cent.; whereas in the past year it was only 2 per cent., which at the cost price of the gas represented a saving of £2000. The increase in the number of consumers was very great, and there were now 7000 more than in 1903. From what was said in the Council three months ago, when it was suggested that the price of gas might have to be increased, people outside might have come to the conclusion that the acquisition of the gas-works was one of the direst calamities that ever happened to Devonport. The fact was that since the Corporation bought the works they had paid £33,000 out of revenue towards liquidating the debt. They purchased the undertaking without a penny of capital, with money borrowed at the rate of about 3 per cent.; and to-day they were making 6 per cent. and upwards on every penny of the money. They had put £5976 into the reserve fund. The cost of obtaining the Act (£3058) had been paid off; the last instalment falling into the past year's accounts. Taking the £33,000 they had paid off the debt, the cost of the Act, and the £6000 (in round figures) in the reserve fund, they had a total of £42,000 clear profit on the working of the undertaking, after paying their way and spending out of revenue thousands of pounds on improvements at the works. In face of this, he could not understand how anyone could imagine there was anything to complain of. Very great improvements had been effected under the present Engineer. He gave Mr. Buckley all the credit. He believed that no town in England had a finer set of officials, and no official of whom they had more reason to be proud than their Gas Engineer. He was not going to call the statement presented a report. It was a proclamation to the people of Devonport that they had in the gas-works the richest prize the town had ever known or ever would know.

The report was unanimously adopted.

HEREFORD CORPORATION GAS UNDERTAKING.

Mr. Townsend's Salary Increased.

The most important item in the report which the Gas Committee submitted at the last monthly meeting of the Hereford Town Council, was the following: "Your Committee report that when the Manager (Mr. W. W. Townsend) was appointed, the salary offered him was designedly a low one—viz., £200, in place of £330 which was being paid to his predecessor—with the intention of giving him a substantial increase if his services were satisfactory. The Committee now report that they are unanimously of the opinion, after receiving the accounts for the past completed year, that the Manager has fully justified his appointment; and they therefore recommend that his salary be increased to £275, dating from the 25th of March last, with yearly increments of £25 until it reaches a maximum of £350 per annum."

In moving the adoption of the report, Mr. Charles Witts, the Chairman of the Committee, said he had a strong feeling—and he was supported by every member of the Committee—that they had got hold of the right man; and it would be the height of folly not to keep him. The Committee had completed their first year with Mr. Townsend as Manager. They thought some time ago they had reached the limit of gas consumption, in view of the strides the electric light was making in the city, and the adoption by gas consumers generally of incandescent burners. But by energetically looking after business—selling gas-cookers, putting in gas-fires, and in other ways—the year had been an absolute record for gas sales. He thought this would come to the Council as a surprise. During the past year, they had sold no less than 3 million feet of gas more than in the previous year. This was a surprising statement, in view of all that they had to contend with. There was one other point he wished to mention, and it was very important. They had further reduced the loss of gas by leakage by 1 million feet; and they must remember that this reduction was on the top of the 1 million feet reduction of the previous year. They had altogether reduced the leakage from 10·42 to 7·1 per cent., or by one-third. As to the profit from sulphate of ammonia, in 1905 it was £324, in 1906 £320, and in 1907 £327; but during the past year they had realized from it £689. This was more than double; and there had been little or no advance in the price. They had had a largely increased make, with the result that they had realized in sales £689, compared with an average for the previous years of £325. They were thus making a extra profit of £350 a year. This one residual alone would have paid much more than Mr. Townsend's salary for the year. Therefore he (Mr. Witts) thought he had made out a case. But if the Council did not think so, let them listen to the following: While the Committee were anxious, as he said to them last year, not to make any increase in the price of gas, they had considerable doubts in the matter, because they had to pay 2s. 6d. per ton more for coal, of which they used 12,000 tons annually. Yet by economy, and increased income from residuals, they had not felt the necessity to raise the price of gas. If this was not successful management, he did not understand the term. He hoped the Council would support the Gas Committee's recommendation to increase Mr. Townsend's salary. The consumers had cause for congratulation that the gas-works were under the control of the Corporation. When the Corporation took the works over 36 years ago, the consumers paid 4s. 6d. per 1000 cubic feet for gas; now they paid 2s. 6d., and the reduction in money alone between these two figures meant £6500 per annum. The net profit at the close of the year ending March, 1907, was £3760, and the net profit at March, 1908, was £5650—an increase of £1890. He should say in these figures they had not included £1000 which went to the improvement fund.

The report was adopted, after some discussion.

The Lighting Committee of the Lambeth Borough Council reported at a recent meeting of the Council that experiments had been in progress for some time with respect to street lighting by gas round the new Town Hall. They had been carried on by the South Metropolitan Gas Company, and were still in progress; and the Committee had received a request to defer coming to a decision in the matter for twelve months from the date of the installation of the present system of gas lighting, in order that the Company might have an opportunity of further testing the system, and, if possible, of improving it. During this period, the Company do not propose to make any charge for the supply of gas or for the lighting and maintenance of the lamps; so that the Council will be relieved of an expense of upwards of £90. The Committee granted the Company's request.

PRICE OF GAS AT BURY (LANCS).

Discussion in the Council.

In his Annual Report to the Gas Committee, Mr. H. Simmonds, the Engineer of the Bury Gas-Works, stated that the total quantity of gas made during the past year was 424,333,800 cubic feet; while that unaccounted for was equal to 3·1 per cent. The following is the working statement:—

	s.	d.
Cost of manufacture, distribution, &c., per 1000 cubic feet of gas sold	2	3¾·35
Less tar, sulphate, coke, and sundries	0	11 ·50
Net cost of gas	1	4½·85
Add interest on loans, stock, and sinking fund	0	7¼·03
Total cost of gas	2	0 ·08
Income from gas, hire of meters, cookers, and boilers	2	3¾·09
Profit (£6258)	0	3¾·01

At March 31, there were 2420 public lamps in use, 2309 cookers, 727 grillers, and 3049 prepayment meters.

The Borough Auditors, in their report, state that the revenue on gas account shows a profit for the past year of £6258, compared with a profit for the previous year of £7517, or a decrease of £1259. This has arisen mainly through the increased cost of coal. There has been an increase in the cost of coal of £3813, in other materials for the production of gas of £166, and in the cost of distribution, chiefly in renewal of mains, of £486. The increases in revenue have been: Gas sold, £2083; residuals, £1000; incidentals, £124. The total capital outlay stood at March 31 at £304,189.

The Committee resolved "that the sum of £3129, one moiety of the profit for the year ended March 31, 1908, be carried to the credit of the general rate, and £3129, another moiety, to the credit of the gas consumers."

In moving the adoption by the Town Council of the minutes of the Gas Committee, Alderman Fletcher, the Chairman, congratulated the Council and the ratepayers on having a sound undertaking in the gas-works. During the last ten years they had progressed, notwithstanding all the electricity that had been supplied in the town. Compared with 319,149,000 cubic feet of gas in 1898, during last year 424,333,800 cubic feet were made. Of course, in order to accomplish this there had been a good deal of money spent on capital account and out of revenue year by year. The works had been kept up to date; and the property had increased in value to the extent of £61,000 within ten years. Their loan account was only £15,000 more to-day than ten years ago; so that year by year they had improved the property, and had taken a good deal of money for the purpose out of revenue. He alluded to the rescinding of the resolution to reduce the price of gas 1d., and the decision to charge the same initial price as last year. Neighbouring towns, he said, put 3d. per 1000 feet on the price of gas, because of the rise in the price of coal; but the Bury Committee put nothing on, and their profit came out at even more than they estimated. Because of the increase in the cost of coal, they had only 2d. per 1000 feet to be allowed to consumers in the coming year as their share of the profits. They charged only the same price as last year; but because of the increase in the cost of coal, it would really cost the consumers 1d. more. He thought the Council would see the Committee were acting in the right way, especially when they considered that of the 1d. per 1000 feet which it would cost them more in the coming year, one-half would go back to the consumers the following year.

Alderman Ashworth, while congratulating the Chairman and Committee on the results of the year's working, said his objection to the report was on the financial side of the question. He wanted to know why the Committee first came to the decision to drop the price of gas, and then through the Finance Committee rescinded the resolution, and put on 1d. A sum of £6000 had been made at the gas-works during the past year—practically the amount which would be obtained from a 6d. rate on the assessment of the borough. Half this sum went back in the shape of discount to gas consumers, and the other half was divided among the ratepayers. While every gas consumer was a ratepayer, every ratepayer was not a gas consumer, and the money came from the consumers and went to the ratepayers. The Committee had £6000 for making something for which they had a monopoly, and fixed the price; and they divided the sum, and relieved the ratepayers who were non-consumers to the extent of 3d. in the pound, extracted from the consumers of gas. For instance, the Peel Mill Company, which was a high-rated concern, received 3d. in the pound on their rate-assessable value out of the pockets of the gas consumers, which was an inequitable arrangement.

Alderman Battersby said that in referring to the Peel Mill using no gas and having relief to that extent out of the rates, Alderman Ashworth should take into consideration the fact that the mill used no water from the Joint Water Board; and the precept from that Board was £5000. If the Peel Mill, as ratepayers, were to have no benefit out of the gas, and pay for water which they did not use, was not this unfair treatment? The ratepayers of Bury were the joint owners of the undertaking, and should not be called upon to sacrifice all the profits of one concern, and bear all the loss on the other. The price of gas in Bury was lower than in any other town in Lancashire, with the exception of Widnes. The addition of 1d. to the price in Bury enabled them to keep the rates as they were; otherwise they would go up 2d. in the pound.

Mr. Hardman remarked that Alderman Ashworth had lost sight of the fact that the ratepayers were actually promoters of the gas undertaking. They found the capital, and they had to bear the whole responsibility. Surely, if they had taken over the responsibility, they ought to be considered. It was a mistake on the part of Alderman Ashworth to say it was an injustice to the gas consumers that they should find something towards assisting to keep the rates down. The Gas Committee had acted wisely; and if they had not expressed willingness to find another £500, it would have meant an increase of 2d. in the pound on the rates.

In reply, Alderman Fletcher said that if Bury charged more for gas than other towns, there would be some reason why they should really consider whether to reduce the price; but the Committee were selling their commodity cheaper than ever it had been sold in the past, and therefore the consumers on that ground could not complain. During the last ten years they had made £61,000, compared with £1800 in the previous ten years. They charged 2d. per 1000 cubic feet less; and, taking it on the whole, there was cause for congratulation, both from the ratepayers' and consumers' point of view. He was sure the Committee's decision would be acceptable to the town generally.

The minutes were confirmed.

DONCASTER CORPORATION GAS SUPPLY.

The Past Year's Working.

The Gas Engineer and Manager to the Doncaster Corporation (Mr. Robert Watson) has just presented to the Gas Committee his report on the working of the undertaking in the year ending March 31.

The manufacture of gas cost £18,883, or at the rate of 17s. 9·61d. per ton of coal carbonized and 1s. 10·27d. per 1000 cubic feet of gas sold. The net cost of gas distributed was £16,397; being at the rate of 15s. 5·47d. per ton of coal carbonized and 1s. 7·33d. per 1000 cubic feet of gas sold. The amount received for gas, public lighting, and stove-rents was £25,560; so that the gross profit was £9163, compared with £9206 for 1906-7. Deducting the interest on loans, deposits, and the instalment of the sinking fund, the surplus for the year is £7997, compared with £8065 for 1906-7. Of the former sum, £5000 is available for the borough fund (equal to 9¼d. in the pound in relief of the rates), £717 for defraying capital charges incurred in the extension of mains, and £404 for meters. The net cost of gas per 1000 cubic feet sold was practically the same as before—1s. 7·33d., against 1s. 7·29d. The cost of coal averaged 11s. 8·79d. per ton, compared with 10s. 6·51d. in 1906-7—an increase of 1s. 2·28d. per ton, due to the higher prices affecting the greater half of the financial year. The increase was, however, more than covered by the gain from residuals, which realized £7897, or 7s. 5·34d. for every ton of coal used, or 1s. 6·51d. more than before. This result was due partly to the better prices obtained for coke and tar, and partly to the saving in coke effected by the new retort-bed furnaces. The saving was 848 tons of coke, compared with the average of the past few years, and was equal to 5¼d. per ton of coal bought, or nearly one-third of the gain in the receipts for residuals. It is confidently believed that the exclusive use of regenerative-fired furnaces recently rendered possible by the new retort-house plant will be advantageous not only in a saving of fuel but in increasing the yield of gas per ton of coal.

The following are a few statistics in reference to the working: Coal carbonized, 21,216 tons; gas made, 219,795,000 cubic feet (10,360 cubic feet per ton, against 10,133 cubic feet); gas sold, 203,529,000 cubic feet (9593 cubic feet per ton against 9353 cubic feet); coke sold per ton of coal, 9·3 cwt.; tar do., 10·6 gallons; and sulphate of ammonia do., 16·6 lbs.

LEIGH (LANCS.) GAS AND WATER SUPPLY.

The Engineer and Manager of the gas and water undertakings of the Leigh (Lancs.) Corporation (Mr. James Gibson) has lately submitted his annual reports, embracing the twelve months ending the 31st of March. He states therein that the gross profit on the Gas Department was £11,798; and that after deducting £10,162 for interest and sinking fund charges, there was a net profit of £1635. Out of this the sum of £710, being the final instalment of the cost of the water-gas plant, and £75 for depreciation of meters, have been paid; leaving a credit balance of £850 to be carried forward. At the beginning of the year there were on the register 2789 consumers by ordinary, and 4483 by slot meters; whereas at the end of the year the numbers were 2763 and 4674. The total number of consumers on March 31 was 7437, against 7272 on the corresponding date last year; being an increase of 165, or 2·27 per cent. The number of gas-stoves in use was 2315, compared with 2330; and the number of grillers, 774. The bulk of coal and cannel carbonized was 13,396 tons, or 159 tons more than in the preceding year; and the quantity of gas sold was 137,412,700 cubic feet, or 2,308,300 cubic feet less than before. The Gas Committee are, however, giving special attention to various means of increasing the consumption. During the past year, stove-rents were entirely abolished; and there is now under consideration the question of reducing the price of gas for power purposes, the supply of gas to districts outside the borough, and the fixing of slot installations. The average cost of coal, cannel, benzol, oil, and carting per ton carbonized—viz., 11s. 6·24d.—was more than for the year 1906-7, owing to the increased price of coal. There was a satisfactory increase in the revenue for coke of £336; while the yield per ton carbonized was about the same as before. The make of sulphate of ammonia per ton of coal carbonized was 24·24 lbs., against 20·48 lbs.—an increase of 3·76 lbs. per ton. The receipts from residuals showed a considerable increase, owing to the better prices obtained and the additional make of sulphate of ammonia. The total capital charges for the year were £10,162, or at the rate of 1s. 5·75d. per 1000 cubic feet of gas sold; and the gross profits (£11,798) equalled 7 per cent. on the capital employed.

The revenue account of the Water Department for the past year shows a loss of £611, compared with £161 in the preceding twelve months. The Engineer explains that the deficit is partly the outcome of a steadily increasing consumption which has not been met by an equal increase in income owing to the fixed charges on assessments. It is also partly the result of higher rates and taxes and an increase in the cost of repairs to mains. The total quantity of water received from the Liverpool Corporation during the year was 231,169,000 gallons, or 13,152,000 gallons more than before. It was distributed as follows: For trade and domestic purposes through 721 meters, 50,589,800 gallons, yielding to the water-rental 1s. 4·35d. per 1000 gallons, or £3446; the remainder yielding 8·113d. per 1000 gallons,

or £6104—total, £9550, compared with £9386 before. Taken on the population supplied (46,000), the total consumption per head per day was 13·73 gallons, compared with 13·27 gallons for a population of 45,000 in 1906-7. The gross cost of water was £7967; the net cost—*i.e.*, less profit on fittings, &c.—£7687. The total, as already stated, was £9550; so that the gross profit was £1863. As the interest and sinking funds amounted to £2474, there was, as mentioned at the outset, a net loss of £611.

SEAFORD COUNCIL AND THE GAS COMPANY.

Arrangement as to the Cost of Laying a Main.

A lengthy, but abortive, discussion took place at the monthly meeting of the Seaford Urban District Council last Tuesday, on a motion to rescind a resolution passed last February, by which the Council agreed to pay the Gas Company the sum of £10 per annum for ten years. The Council were at the time desirous of lighting a certain portion of the Eastbourne Road, and other places; and the Gas Company stated their willingness to lay the necessary mains if the Council would make the payments named, or give a lump sum of £90 as soon as the work was done. The Council accepted the first-named offer; but since then there has been some alteration in the membership of the Council.

The resolution to rescind the agreement come to was moved by Mr. Newman, who said his object was to obtain from the Council, if possible, a decision that the endowment of a private concern from the public funds was an injudicious act, and one likely to prove prejudicial to the best interests of the town. He pointed out when lamps were put on the esplanade a few years ago that trouble was likely to follow, and that they would be full of applications for lamps. The Council, as constituted last year, prepared an estimate, which included certain conditions for the erection of more lamps. The new members elected last April (who constituted one-third of the Council) did not, however, agree with the terms embodied in the report, and voted against it. He was not at all against lighting the town; but one very important point about which the new members complained was the heavy expenditure which would be necessary for the new lamps. They had investigated the cost, and procured the advice of experts on the matter, and found that there had been a very grave mistake in the estimate, which would probably alter the decision of some members upon the question. He would not give the figures on this occasion, because he thought they ought to come up in committee first. But he had it on good authority that his figures were perfectly correct; and if the motion was rescinded, the whole matter could be thoroughly explained to all the members.

Mr. Kent, in seconding the motion, remarked that he did not wish to criticize the old Council in a carping spirit. Perhaps it was from an over-dose of zeal, or perhaps from the thought that they were doing something for the good of the town, that they were led into the error of accepting the terms of the Gas Company. The new-comers on the Council objected to the expenditure in question, chiefly upon three grounds. Firstly, they thought the charge proposed for the laying of the new mains was excessive. He would not be so squeamish as Mr. Newman in regard to figures, which were obtained by himself from a gentleman who was an expert in the matter. At the last meeting of the Council, the Chairman of the Lighting Committee, he believed, said the Gas Company were asked to lay from 1½ to 2 miles of new mains. It was stated at the same meeting by somebody else that the cost would amount to from £300 to £400. Some of the members were inclined to accept these figures with a grain of salt. Consequently, on the following day he took the trouble to go into details, and ascertained that the length of new main needed would be 1100 yards, or about three-quarters of a mile. Then he submitted details to an expert as to the cost of laying this length of main; and he had the figures before him. He believed himself that they could get the work done for the sum of £160 at the outside; and this being so, was it right that the ratepayers of the town should be called upon to pay £100 out of £160 for work of which, when completed, not one iota would belong to them. This was his first reason for getting the motion rescinded. Secondly, he would like to urge strongly the fact that the Gas Company had proved an expensive item to ratepayers of Seaford in regard to highways during the past seventeen months. The Surveyor had furnished him with particulars showing that during 1907 and up to May of this year the Gas Company had opened the roads no fewer than 84 times, out of a total of 118. Taking an average cost to the Council of £1 for each opening, it would be seen that the cost had been considerable; and if this £100 were to be paid to the Gas Company, it should go towards the cost of repairing the roads which had been thus damaged. His third point—and perhaps this was the most important—was that the action of the Council in passing the resolution was *ultra vires*. He submitted that the Council had no power to grant this sum of money to a private undertaking such as the Gas Company. It would be a different matter if the Company treated them more fairly. People were rising up against the high cost compared with the quality of the article supplied. At the last meeting, the question was raised whether this was a legal payment; and he was not satisfied it was. He was determined to carry the matter through to the end; and if necessary he should certainly appear before the Auditor and object to the payment.

On the motion being put, three members voted for it and three against. The Chairman (Mr. D. Muddle) declined to vote, and the question therefore dropped; the Clerk remarking that nothing could actually be done in the matter until the Committee brought up a recommendation authorizing the Gas Company to proceed with the work. A similar tie resulted on a subsequent proposition that the Surveyor should be asked to get out an estimate of the cost of laying the mains referred to.

The British Consul at Berlin, in the course of his annual report, which has just been issued by the Foreign Office, says that incandescent gas lighting is being more and more extensively used in Germany; and that the Prussian-Hessian Railway authorities have decided to adopt it on their passenger cars.

PUBLIC LIGHTING AT COLCHESTER.

Surveyor's Estimate of Cost of Incandescent Gas and Electric Lamps.

At the last Meeting of the Colchester Town Council, the Borough Surveyor (Mr. H. Goodyear) submitted estimates of the cost of converting the 691 incandescent gas-lamps and 316 Nernst and incandescent electric lamps to Osram electric lamps; also a statement showing the cost of lighting public street-lamps by electricity as compared with incandescent gas. He furnished the following particulars: Conversion of 691 gas-lamps to Osram electric lamps, £2295 11s. 11d., an average of £3 6s. 5d. per lamp; conversion of 316 Nernst lamps to Osram lamps, £371 6s., an average of £1 3s. 6d. per lamp. Cost per annum of the maintenance of 691 incandescent gas-lamps, £1799 9s. 7d.; average cost per lamp, £2 12s. 1d.; illuminating power per lamp, 80 candles. Estimated cost if replaced by Osram lamps, £2073; average cost per lamp, £3; illuminating power per pair of lamps, 70 candles. Cost per annum of maintenance of 316 electric lamps, £1260 12s. 6d.; average cost per lamp, £3 19s. 9d.; illuminating power per lamp, 73½ candles (average). Estimated cost if replaced by Osram lamps, £1082 10s.; average cost per lamp, £3 8s. 6d.; illuminating power per pair of lamps, 70 candles. The renewals of the Osram lamps are placed at three pairs per lamp per annum. This is based on an average life of 1000 hours each, the number given by the makers as the probable life, though not guaranteed by them. The Surveyor added that the eight Osram lamps the Committee had had fixed as an experiment were burning exceedingly well. It was resolved that the present Nernst electric lamps should be replaced by Osram lamps, as renewals become necessary; and that, as an experiment, new 210-volt single 60-candle Osram electric lamps should be fitted to the 16-candle incandescent electric lamps, and to six lamps in the High Street now lighted by means of Nernst lamps, subject to the fittings being obtained at a small cost.

GAS, WATER, AND GENERAL INVESTMENT TRUST.

A Rearrangement of the Company's Affairs.

At the Annual Meeting of the Trust, held towards the end of March, a Committee was appointed to confer with the Board in regard to the existing unsatisfactory state of affairs; and it was arranged that a report should subsequently be made to the shareholders.

This report has now been issued; and in it the Committee state that numerous conferences have been held with the Directors, and several suggestions have been made with regard to the general policy of the Trust, with the result that certain changes were decided upon, and the Board are now in complete agreement with the Committee. The principal change is the reconstitution of the Board. Mr. C. Temple Layton and Mr. William Parker, two members of the Committee, have accepted seats on the Board; and in order to make way for them, Mr. C. S. B. Hilton and Mr. E. L. Hamilton have resigned their seats—the number of Directors thus remaining at six. The Committee wish it to be distinctly understood that this is no reflection on the conduct of the gentlemen who retire, but is merely the outcome of the loyal desire on the part of the Board to promote the best interests of the stockholders. In order that the reconstituted Board may have opportunity to make a fuller investigation into the position and prospects of the several investments of the Trust than has been possible for the Committee in the time at their disposal, it is not proposed that a meeting of stockholders be convened forthwith, but, should circumstances require it, the proprietors will be called together at an interim meeting to be held before the next annual meeting, when the position of the Trust can be more fully explained. Owing to the inclusion in last year's revenue of a sum of over £5000, being the balance of the Utah Commission account, and from various other causes, the current year's revenue will show a serious diminution on that of last year, and the reconstituted Board will not be in a position to pay an interim dividend on the preferred stock. With regard to the United Railway and Trading Company, in which the Trust have embarked a sum of approximately £250,000, the outlook is problematical. Since the last annual general meeting of the Trust, a further issue of £35,000 prior lien debenture stock has been authorized by the bondholders of the Trading Company for the purpose of financing the current year's operations; and this will be available as security for any further advances that may be required. The Committee did not consider the position of the Gas, Water, and General Investment Trust to be such as justified the Board investing further moneys in this Company, and accordingly no other advance has been made since the date of the annual meeting. The Board of the United Railway and Trading Company have informed the Committee that it is their intention to carry out a sale of the major portion of the property if a fair price can be obtained, and state that with this object they are in communication with parties in the United States. Experiments are being continued with a view to proving the possibility of profit on the manufacture of paper from bagasse on a commercial scale. Owing to the impossibility of placing a value on the Trust's holding in the United Railway and Trading Company that can have any pretensions to accuracy, the Committee cannot give any figures with regard to the total value of the assets of the Trust. As stated by the Chairman at the annual general meeting, quoted securities showed a depreciation of £160,500 on Jan. 28 last; and in addition, the unquoted securities showed a serious depreciation. The Committee view with satisfaction the efforts of the Board to reduce the outstanding liabilities of the Trust, and report that the item of loans from bankers and brokers has been materially reduced since the date of the balance-sheet. The utmost efforts are being made by the Board to increase the revenue of the Trust and to reduce the liabilities and also the expenses of management.

The offices and show-rooms of the United Chemical Works, Limited, have been removed from Leadenhall Street, to No. 79, Turnmill Street, E.C.

REINSTATEMENT OF ROADS AND FOOTWAYS.

At a recent Meeting of the Westminster City Council, the Works Committee reported that they had considered a letter received from the Gaslight and Coke Company asking the Council to nominate one or more representatives (presumably members of the Works Committee) to receive a small deputation from some of the public companies whose duties involve interference with the surface of thoroughfares, in order to discuss, and, if possible, arrive at a settlement of, the questions relating to the charges for paving, which have so long been in dispute. The main points in dispute are: (1) The charges generally made for reinstating roads and footways, and particularly the charge for the use of the steam-roller in all cases, whether the openings be large or small; (2) The Council's requisition for more concrete to be used than was originally in the trenches, for repairing with larger paving-stones than those taken up, and for relaying the stones with cement instead of mortar; (3) the embedding of mains in concrete, the cost of alterations to mains when street-widenings occur, and cases in which, if the pipes are not moved, they may be covered over by the Council's works and rendered inaccessible; and (4) the Council's requisition for the area of reinstatement over trenches to be of unnecessary width. The Company state that the object of the proposed conference is to arrive at a definite understanding with regard to the paving charges in the future; and they consider that on some points agreement between the parties should be a very easy matter, while on others a friendly reference to a legal tribunal may perhaps be necessary. The Company are most anxious to have the position clearly defined, and then to effect a settlement of the Council's accounts against them for paving works, which have been all too long outstanding. The Committee reported that they had agreed with the suggestion of the Company and had appointed the Mayor (Mr. J. W. Dennis), their Chairman and Vice-Chairman (Alderman Spencer-Smith and Mr. J. Abady), together with the Town Clerk (Mr. J. Hunt) and the City Engineer (Mr. J. W. Bradley, M.Inst.C.E.) as the Council's representatives at the proposed conference.

At the meeting of the Paddington Borough Council last Tuesday, the Works Committee reported that for several years past the Council and their predecessors (the Vestry) had reinstated trenches opened by the public authorities and companies, and charged for the work on the basis of schedules which had been adopted from time to time. Considerable difficulty had been experienced in recovering the amounts charged, and the matter had recently been under consideration by several Committees of the Council. The Legal Committee had informed the Works Committee that the charges should in future be on the basis of the actual cost of the work, after giving due notice to the parties affected. The Works Committee endorsed this view, and recommended that an intimation should be given to the public authorities and companies concerned that, after the current quarter, in cases where the public highway is disturbed by them for the purpose of laying, repairing, or taking up mains, pipes, &c., the Council will charge for the reinstatement thereof on the basis of the actual cost, instead of on the schedules of prices hitherto in force. The recommendation was adopted.

GAS OR ELECTRICITY FOR INFIRMARY LIGHTING.

City Guardians Decide on Electricity.

At the Meeting of the City of London Board of Guardians last Tuesday, consideration was given to the question of lighting the new infirmary buildings at Homerton. The Amalgamation (Bow and Homerton) Committee, who recommended electricity, reported that an estimate and other details had been presented by Mr. A. E. Pridmore, the Architect, who had obtained figures from Mr. L. L. Robinson, the Borough Electrical Engineer of Hackney, in regard to electric lighting, and from the Gaslight and Coke Company for lighting by gas. The estimated cost of the electricity scheme was stated to be about £1000, which included everything ready for use; while the Gas Company offered to equip the institution with incandescent gas for £289 7s. 9d., charging for the fittings only. Under the electricity scheme, there would be about 662 points, and a total of about 13,000-candle power, made up of 350 30-candle Osram lamps, and 74 16-candle, and 160 8-candle carbon filament lamps. There were also included 100 wall-plugs to take hand-lamps for the use of the doctor in examining patients if required. The illuminating power provided for in the gas scheme was about 30,000 candles (the number of points being about 500); being made up of 367 "C" Bray burners, each of 60-candle power, and 45 2-light "Humphrey" lamps of 180-candle power each. It was mentioned that under the former scheme there were a number of lamps of low candle power which would be in the stores, &c., where but little light was required. According to Mr. Robinson, the annual cost of electricity would be amply covered by £150; his figures being based on actual experience of some similar institutions in the district. The Gas Company gave £283 16s. 8d. as the annual cost; their figures being based on the assumption that the average lighting hours would be three per day, or approximately 1000 hours per annum, and an hourly consumption of 2000 cubic feet—the total being 2 millions per annum, which, at 2s. 10d. per 1000 cubic feet, would cost the amount mentioned. With regard to the annual expense for maintenance, Mr. Robinson said an allowance of ¼d. per unit was usually sufficient; but, owing to the large number of Osram lamps, the cost might be more. At ¼d. per unit, it worked out at £40, and at ¾d. per unit at £60 a year. The Gas Company would maintain at a cost of £82 15s. per annum. The comparative costs of electricity and gas were set out as follows: Initial cost per candle power for electricity, 1s. 6½d.; for gas, 2½d. Annual cost of illumination for electricity, 2¾d.; for gas, 2½d. Annual cost of maintenance for electricity, 1d.; for gas, ½d. The total cost of electricity was given as £210 (the annual cost of maintenance being reckoned at £60), compared with £366 11s. 8d. for gas. It was pointed out that the total candle power given by gas was more than double that furnished by the electricity scheme, but that the latter had a greater variation in the illuminating value of the lamps, and that one 8-candle lamp would be used in a position which would only require a small light, whereas in the same position a gas-lamp would be using light equal to 60 candles. The Osram electric lamp gave 30-candle power against the Bray 60-candle burner. The schemes only referred to the new buildings and the altered part of the old ones. Electric lifts were to be provided in any case, necessitating the laying of an electric cable, which the Borough Council would not do free of charge for this item alone. There was also the fact, it was observed, that it might be considered advisable to have electric power for the laundry machinery, though this did not directly concern the question of lighting the buildings. The Committee recommended that electricity should be adopted, and that the Architect proceed to obtain tenders.

The Chairman of the Committee (Mr. J. B. Wild), in moving the adoption of the report, remarked that Mr. Robinson, having been approached by the Architect, based the particulars which had been presented to the Guardians upon experience obtained from three or four sources. By adopting electricity, the Guardians would save, according to the estimate, £156 per year. Moreover, if they did not have electric lighting, they would have to pay for the laying of the cable for the lifts and the laundry machinery. Mr. J. H. Lile complained that it was very unbusinesslike that they should decide definitely on the adoption of electricity merely upon the views of a paid official of the Hackney Borough Council, which authority would supply the current; and he proposed that, before the Committee's report was adopted, an independent expert should be consulted. Mr. M. Wilkinson seconded the amendment, which was supported by Mr. B. Turner, who said he had had most unpleasant experiences in connection with the electric light, and often found, after its installation, that the statements made by those who professed to know all about it were quite inaccurate. Before electric lighting was adopted, the Guardians should have further advice as to whether or not electricity would be best. He would not like to accept £150 as the annual cost of lighting by electricity. Mr. Wild said his experience in several cases was that electricity was really cheaper than gas. Miss Gregory asked how the electric lighting would compare with that at the Bow institution; remarking that now that gas was taken away it was impossible in the evenings for the old people to read or do sewing work. If the same conditions were to prevail at Homerton, it would be disastrous; and she begged the Committee to take this matter seriously into account. She confessed that, on her own experience, the figures before the Board gave her grave cause for doubt. Mr. Wild pointed out that the lamps to be employed at Homerton would be very superior to those installed at Bow. On a division, the amendment was lost by 12 votes to 10, and the Committee's report was adopted.

SHEFFIELD CORPORATION WATER SUPPLY.

The Past Year's Working.

The General Manager of the Water Department of the Sheffield Corporation (Mr. W. Terrey) has lately presented to the Water Committee his report for the year ending the 25th of March last. It shows that the total capital expenditure on the undertaking up to that date had been £3,409,926, compared with £2,410,625 at the corresponding period last year. The total income from all sources for the year was £165,764, or £4430 higher than that for 1906-7; and the expenses of maintenance and management amounted to £36,140. The net revenue was therefore £129,624, or £3904 more than before. Deducting annuities and interest, £109,627, the net profit was £19,997—an increase of £1588. The sinking fund requires £13,009; so that the surplus for the year is £6988. The reduced charges to consumers for domestic and trade purposes during the year amounted to £29,940. The value of water supplied to the Health Committee without charge for street watering, public baths, &c., was £3505; making a total remission for the year of £33,445, or equal to 5d. in the pound on the district rate. The special account relating to the sinking fund shows that the total sum provided out of revenue and appropriated for the repayment of debt to the 25th of March last, with earnings thereon, amounts to £228,533; and the accumulated surplus on that date was £145,086. The average estimated population supplied during the year within the statutory district, which covers an area of 128 square miles, was 488,545—an increase of 1·88 per cent. The Corporation also supply water in bulk to Rotherham, Doncaster, the Rotherham rural district, Handsworth, Chapeltown, and other outside districts, representing an additional population of 165,943; and making a total population of 654,488 supplied from the works of the Corporation. The number of houses served was 104,569, or an increase of 1650. The additional number of water-closets supplied was 5200, making a total of 47,828; and of baths 1041, bringing up the total to 14,465. The total domestic and trade supplies on the 25th of March last was 187,987; being an increase of 8210 new supplies laid on during the year. The total volume of water sent from the works of the Corporation during the year, including the statutory compensation water to the Rivers Rivelin, Loxley, and Little Don, was 9,871,238,143 gallons. This was disposed of as follows: Trade purposes, by meter, 1,740,612,000 gallons; supplies in bulk to local authorities by meter, 237,482,900 gallons; statutory supplies to Rotherham and Doncaster, 951,360,000 gallons—total supply by meter, 2,929,454,900 gallons. For domestic purposes, including water supplied for extinguishing fires and waste, 2,215,707,972 gallons were delivered; making the total town supply 5,145,162,872 gallons. Adding the compensation water, 4,726,075,271 gallons, makes up the above-named total of 9,871,238,143 gallons, compared with 9,461,388,604 gallons in 1906-7. The average daily supply in the past financial year was 26,970,596 gallons, against 25,921,613 gallons in the preceding twelve months.

At the meeting of the City Council last Wednesday, Alderman Styring directed attention to the salient features of Mr. Terrey's report. He remarked that the past year's working had been most successful from every point of view; the total income being £165,764. This amount in one year showed the enormous growth of the water undertaking from what it was 21 years ago; for when it passed into the hands of the Corporation, the total income for the first

complete year was £88,131. It would be seen from this comparison that during the past score of years the income had almost doubled itself. The surplus for last year was £6988—an increase of £944 compared with 1906-7. This was a very substantial and satisfactory amount, considering they had had to bear the annual charges of the enormous works constructed in the Little Don Valley. The sinking fund now amounted to the handsome sum of £228,533, and if the fund were left alone, earning compound interest, it would be sufficient to extinguish £1,508,014—three-fourths of the original purchase-money for the works, which stood at £2,092,014. They had heard a good deal about the bad trade; but there were some very significant figures in connection with the water employed for trade purposes and registered by meter. In the year to March, 1907, the quantity used was 1,715,434,915 gallons, while for the working year just ended it was 1,740,612,000 gallons. This showed that, in spite of the falling off in business, which started in September, an enormous volume of water was still being used in connection with the trades of the city, the quantity being 25,177,085 gallons more than that employed in the year ending March 25, 1907. Alderman Styring went on to allude to some of the advantages accruing to the city as the result of owning the water-works. In the first place, he said that during the past year they had supplied to the Health Committee, for sanitary purposes and baths, water which if charged for would have cost £3505. This was a very substantial advantage to the city from possessing its own water undertaking. The Finance Committee also benefited, for they had only been charged 3½ per cent. for amounts lent from the accumulated surplus. The Water Committee had also constructed the Rivelin Valley Road for the citizens, at a cost of £58,306; while the sum of £38,797 was actually spent on making the beautiful roadway that ran between Malin Bridge and Hollow Meadows Road. This was entirely free of cost to the city. He was fearful that envious eyes would be cast on the accumulated reserve of £145,086. He would mention that £58,306 of it was locked up in the Rivelin Valley, which left them £86,780. He, however, reminded them of the amount of money still required for the undertaking they had embarked upon with respect to the filter-beds at Langsett, and also that within the next eighteen months they would have to find £30,760 towards the cost of the Derwent Valley scheme. They could consider themselves very fortunate that they had not been obliged to put on any increased charges for the new supply.

DEVONPORT CORPORATION WATER SUPPLY.

At the Meeting of the Devonport Town Council on Thursday, the Chairman of the Water Committee (Alderman Blackall) presented their report for the past financial year, an abstract of which appeared in the "JOURNAL" for the 2nd inst. (p. 585). In moving its adoption, he said the laying of the pipe-line from Roborough to Dousland had been completed; the work having occupied six months. The new service-tank at Dousland was making good progress, and would be completed in five or six weeks. Great credit was due to their Engineer (Mr. F. W. Lillicrap) and his staff; and the success with which they had carried out the work convinced him that in these matters it was better to rely on their own officials than to go outside the town for experts. The employment of direct labour had been a benefit to the people of the town who were in want of work. As to the progress of the undertaking, the financial statement showed that the gross profit was £11,642; and after meeting charges for interest, &c., amounting to £11,197, they had a net profit of £445. This sum was carried to the reserve fund, which they were authorized to create for the purpose of helping them to meet the heavy liabilities which would be imposed at the end of five years, when they would have to begin to pay off the debt. This year they had paid £262, the cost of the stock and loan, and £865, a proportion of the expense of obtaining the Act of Parliament, of which only one more instalment had to be met. They had to pay about £300 in consequence of the blocking of the leat by frost and snow last winter; and there were several other little items of expenditure which would not recur, but which had helped to diminish the profit. On the whole, however, the accounts were satisfactory. He believed that next year the Water Committee would be able to put a very much larger amount into the reserve fund; and he had no doubt that in the period of five years which Parliament had allowed them before the payment to the sinking fund began, they would, as he had anticipated, create a reserve fund which would enable them to go on for two or three years beyond that time without making any demand upon the ratepayers. Alderman Littleton, in seconding the motion, remarked that the work of laying the new main and building the tank had been carried out by the Engineer and his staff in a way that could not have been excelled by any contractor. The report was adopted.

Good Progress at the Chard Gas-Works.

A very satisfactory report on the result of the past year's working of the gas undertaking was submitted at the last meeting of the Chard Town Council. When the works were taken over by the Corporation in 1904, a good deal of doubt was expressed as to whether they could be made to yield sufficient revenue to pay the charges on the heavy capital outlay. There has, however, been a large increase in the number of consumers and in the sale of gas, with a corresponding increase in the revenue. The consumption, which in the last year of the Gas Company was 21,066,000 cubic feet, had risen last year to 29,130,700 cubic feet; and the gross profit had increased from £1895 in 1904 to £3643 in the past financial year. The number of consumers has risen from 404 to 735; and there is a steadily growing business in the prepayment meter department—last year's slot-meter sales being at the rate of 14·42 per cent. of the total. The undertaking has become not only self-supporting, but, after paying £3608 for sinking fund and interest, showed a net profit of £47. The Chairman of the Gas Committee remarked that this result was the more satisfactory, seeing that the price of coal meant an increase of £300 in the expenditure.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Contracts Sub-Committee of the Glasgow Corporation Gas Committee on Wednesday considered the tenders submitted for the supply of coal for the ensuing year. It was resolved to purchase provisionally 730,000 tons; and it is understood that prices range from 1s. 9d. to 2s. per ton under those accepted last year. The price was then about 3s. per ton higher than in the year preceding.

Last week, in the Glasgow Town Council, Mr. Alston asked the Convener of the Gas Committee whether it was the case that between thirty and forty men at Dawsholm were working their notice, while a considerable number of men were doing additional work, for which they were being paid extra wages, and that certain numbers who were being paid off were being displaced by that system of working. Bailie M. W. Montgomery, the Convener, replied that it was true that a number of men were on their notice at this particularly slack time. As regarded extra work, a few men had been doing this in anticipation of a holiday; but all the men were now working normal hours. Mr. Alston also asked if it was the case that the Works Manager at Provan, in making alterations on the working time of the men, stated, on the authority of the Gas Engineer, that those alterations were the direct outcome of the policy pursued by Councillor Alston in the Committee on Wages and Conditions of Service. Were the alterations in accordance with the resolution submitted by him for a six-day week in all the departments of the Corporation? Bailie Montgomery replied that the Engineer had informed him that there had been a slight alteration in the time of a small number of men, but that the alteration had nothing to do with Mr. Alston's policy in regard to the Committee on Wages and Conditions of Service. Mr. Alston also asked if it was the case that men with eleven years' service had been dismissed from Dawsholm, while others with six months' service had been retained. Bailie Montgomery said it was the rule to retain men of long service; but it was quite possible that young men who had proved themselves valuable might be kept on, though their period of service was short. He had no information as to men of eleven years' service having been dismissed.

The Gas Committee of the Alloa Town Council had before them on Monday the accounts of the Gas Department for the past year. These showed a satisfactory surplus, after meeting a deficit of £450 on the working of the Electricity Department. The quantity of gas consumed was 107½ million cubic feet—an increase of about 4½ millions upon the preceding year. The estimates for the year ending the 15th of May, 1909, show a greatly decreased cost for coal, and enable a reduction to be made in the price of gas. The Committee therefore agreed that the prices be reduced from 2s. 6d. to 2s. 2d. per 1000 cubic feet for lighting, and for gas-engines from 2s. to 1s. 6d. per 1000 cubic feet, on a differential scale. This restores the prices to what they were before they were raised in July of last year.

The quantity of gas made in the Arbroath Corporation Gas-Works during the year ending May 15, it was reported to the Town Council on Monday, was 95,886,900 cubic feet—an increase upon the preceding year of 4,007,700 cubic feet. The gas made per ton of coal carbonized was 9795 cubic feet—an increase of 157 cubic feet. The quantity of gas sold was 88,564,730 cubic feet—an increase of 5,330,073 cubic feet. The amount receivable for gas was £14,271—an increase of £1780. The sum received for gas supplied through ordinary meters showed an increase of £919, and the amount received for gas supplied through prepayment meters an increase of £861. Allowing 1,641,021 cubic feet for gas used in the works, there remained 5,681,149 cubic feet unaccounted for—equal to 5·9 per cent. There were now in use 2561 prepayment meters—an increase of 309; and of ordinary meters, 6140—an increase of 230. The number of cookers, grillers, and rings now fixed for consumers is 3209—or an increase of 651. The gas-stove capital account stands at £4065. A sum of £55, representing bad debts to May 15, 1906, had been written off. During the year there was expended on main and service pipes, station-meter, retort-house governors, coal-waggons, &c., £1668, which had, in the meantime, been placed to suspense account. After charging against revenue the sum paid as compensation in connection with the gas explosion in September last, and also providing for sinking fund and suspense account, including an extra allowance to write off the cost of the retort-bench, there is a balance on revenue of about £774. In view of the reduction in the price of coal, and on a calculation of the probable consumption of gas, the Manager—Mr. A. C. Young—was of opinion that the price of gas might now be reduced. The Gas Committee, having in view the heavy charge which had to be met during the past year in consequence of the explosion at the works, were of opinion that it would in the first place be advisable now to establish an emergency fund to meet any such claims or contingencies, and that this would be more advantageous than to insure the risk with an insurance company. They therefore resolved, subject to the approval of the Town Council, that, in view of the balance of £774, a sum of £500 should be placed to the credit of an emergency fund, and that the balance of £274, or whatever might be the exact sum ascertained by the Auditor, should be carried forward. It appeared to the Committee that the gas supplied subsequent to May 15 last might be reduced to ordinary consumers to 2s. 11d. per 1000 cubic feet, with a rebate of 2½d. per 1000 cubic feet in the case of gas used for motive power; and to 3s. 4d. per 1000 cubic feet for gas used through prepayment meters. Provost Alexander moved the adoption of the minutes of the Gas Committee. He remarked that the thanks of the community were due to Mr. Young for his great exertions during the year on behalf of the gas-works, and to the Convener for his attention. The gas undertaking was one of the best assets they had. The motion was agreed to.

In Broughty Ferry during the past twelve months the gas made amounted to 62,287,000 cubic feet—an increase upon the previous year of 394,900 cubic feet. Residual products realized as follows: Coke £1612, sulphate of ammonia £994, and tar £314. There is a surplus on the year's accounts of £513. The disposal of this has not yet been considered, but suggestions have been made to the effect that it might be applied in the reduction of the price of gas, in reducing the capital indebtedness, or, again, in the giving of easier terms to gas consumers using prepayment meters.

The Dunfermline Town Council last week ratified the agreement which had been come to for the supplying of gas to the villages of Limekilns and Charlestown, on the shores of the Firth of Forth. There were also agreements to enter into with the District Committee of the County Council and the Earl of Elgin, who is the proprietor of the lands in the district. The District Committee expressed their willingness that the gas-pipes should be laid in the public road, if the work were done to the satisfaction of their Surveyor, and the depth at which the pipes were laid was not less than 18 inches. The Earl of Elgin stipulated for a payment of 2s. 6d. annually as wayleave, and the payment of compensation to agricultural tenants for damage to crops. These conditions were readily accepted by the Gas Committee. At the same meeting, Bailie Stewart intimated that the gas accounts for the year had turned out most satisfactorily for the town. The deficiency on the year's working was less than £100. This was something to smile at, when they took into consideration that they had had to pay over £2000 more for coal, and kept the price of gas unchanged.

The annual meeting of the Bothwell and Uddingston Gas Company, Limited, was held on Tuesday. The Directors reported that the balance at the credit of the revenue account for the year was £2627. Including £1308 brought forward, there was at the credit of the profit and loss account a sum of £3788. Out of this, the customary dividend of 10 per cent. on £23,000 was paid, absorbing £2300, and leaving £1488 to be carried forward. There was no capital outlay upon the works during the year; but £400 was expended upon new gas-stoves. The gas sold amounted to 60,579,400 cubic feet—an increase of over 6½ million cubic feet. The revenue from the sale of gas was £8292—an increase of £1668, though the price was retained at 2s. 6d. per 1000 cubic feet. The revenue from the hire of gas-stoves was £53, compared with £21. Coke realized £2422, compared with £2401; tar, £450, compared with £426; and sulphate of ammonia, £919, compared with £1345. Coal cost £4206, compared with £3346. The Engineer and Manager—Mr. L. Hislop—has a remarkable faculty of winding up his business year by year without having any stocks, either of coal or residuals, on hand.

In the Fraserburgh Town Council last week, Mr. Gray, the Convener of the Streets Committee, stated that the Gas Company had offered to light the streets at the following rates: Long-time lamps, 37s. each; short-time lamps, 12s. 6d. each. The extension of the lighting period would entail an additional annual outlay of £33, making the total cost for the year £260. It was very desirable that the lighting of the town should be improved. He moved that the Gas Company's terms be accepted. After some comments upon the attitude of the Company, the motion was agreed to.

At the twenty-third ordinary general meeting of shareholders of the Cambuslang Gas Company, Limited, on Wednesday, it was reported that the balance of profit amounted to £2728. On the recommendation of the Directors, a sum of £1620 was applied in payment of a dividend of 6 per cent.—making, with an interim dividend of 3 per cent. already paid, 9 per cent. for the year; £550 was carried to depreciation account, £200 was placed to reserve, and £358 was carried forward.

The Leven (Fife) Gaslight Company, at their annual meeting on Wednesday, declared a dividend at the rate of 7½ per cent. The business of the Company has been developing rapidly within recent years; the output of gas having increased from 20 million cubic feet to 33 millions in nine years. In their report, the Directors stated that they "have resolved to recommend that the Company be converted into a company with limited liability, to be called the Leven and Methil Gas Company, Limited, with a capital of £20,000, in shares of £1 each, of which 18,000 are proposed to be issued at present." Notice of a motion to this effect, to be considered by the shareholders at a special meeting, was given on Wednesday. The capital of the Company is £9000.

The East Wemyss Gas Company, an undertaking contiguous to that at Leven, and which supplies both East Wemyss and Buckhaven, are also about to seek registration, with an increase of capital from £3500 to £5000.

In the Corporation Gas-Works at Wishaw, during the past year the quantity of gas made amounted to 69,138,700 cubic feet—an increase upon the preceding year of 5,283,400 cubic feet. The gas consumed amounted to 63,612,500 cubic feet, leaving unaccounted for 5,526,200 cubic feet—equal to 7·9 per cent. The gas consumed through private meters amounted to 59,093,100 cubic feet; by street-lamps, 3,673,975 cubic feet; and in the gas-works, town and factory clocks, Manager's house, burgh chambers, sulphate-house, and gas-works offices, 845,425 cubic feet. The coal carbonized amounted to 7844 tons, from which the yield of gas was 8814 cubic feet per ton. Ordinary consumers numbered 2340, and prepayment meter consumers 1834—total, 4174.

In the Hamilton Town Council this week, the Gas Committee reported the results of their visits to the gas-works at Stirling, Alloa, and Paisley, to inspect the stoking machinery in use in these places, and expressed the opinion that machinery for coal breaking, conveying, and stoking should be introduced at Hamilton. In the meantime, they instructed the Gas Manager—Mr. J. Ballantyne—to prepare tracings showing the apparatus required, and to obtain for next meeting further information, with prices from the makers of such plant.

The Corporation of Arbroath, after repeated vain endeavours to supply the town with water from an underground source, some years ago confessed themselves baffled, and proceeded with the introduction of a gravitation supply. The scheme is now completed; and the water was turned on last Wednesday by Mrs. Alexander, the wife of the Provost of the burgh. The water impounded is that of the Noran, at a distance of 24 miles from the town. About a mile lower down the stream a compensation reservoir has been built, covering 28 acres, and containing 60 million gallons of water. On the way to the town, tanks have been constructed at three different points, for the breaking of the pressure. The last of these is at Muirbeads, 3 miles from the town; and it was there that the turning-on ceremony took place. The compensation reservoir was the greatest piece of engineering work required; it being necessary to construct a dam 475 feet in length, rising from a depth of 30 feet below the bed of the stream to 37 feet above it. The pipes used are mostly 12 inches diameter. The quantity of water which may be taken is 1½ million gallons per day. The Engineers to the scheme were Messrs. Crouch and Hogg, of Glasgow; and the cost has been £85,000.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *June* 13.

Sulphate of Ammonia.

Throughout the week the market has been very quiet, and, though prices have not altered very much, the tendency is still in favour of buyers. Available supplies do not seem to be excessive; but buyers are persistently holding aloof, and deliveries are practically all being made on contracts made in advance. Consequently, the closing quotations are £11 17s. 6d. per ton f.o.b. Hull, £12 per ton f.o.b. Liverpool, and £12 2s. 6d. per ton f.o.b. Leith. During the week sales have been made by makers for July-December, but prices have not transpired. Makers' views, however, are for the most part quite above the market, and first-hand business has been limited. There has been speculative offering abroad for July-December, and up to April, at a discount on spot prices; and a considerable business is understood to have resulted.

Nitrate of Soda.

This article is quiet in all positions, and spot prices are 10s. and 10s. 3d. per cwt., for ordinary and refined qualities respectively.

LONDON, *June* 15.

Tar Products.

The markets are without any change of importance. Pitch is quiet, and business is being done on the Continent for both prompt and forward delivery at very low figures; while in South Wales, particularly low figures have been accepted for prompt delivery, and also to the end of the year. Creosote is rather steadier in London, where the makers appear to have cleared out the prompt parcels which were somewhat depressing the market. In the North, however, the position appears to be unchanged. Benzol, 90 per cent., is quiet. Northern makers continue to be sellers at 7½d. f.o.b., and in some cases lower figures have been accepted. In 50-90 per cent. benzol and toluol, no business of importance has transpired. Solvent is steady without any alteration in price. Carbolic acid is weak and practically unsaleable for prompt delivery. Naphthalene is unchanged; but salts are rather firmer. Tar is easier in many quarters.

The average values during the week were: Tar, 11s. 6d. to 15s. 6d., *ex* works. Pitch, London, 19s. 6d. to 20s.; east coast, 18s. to 18s. 6d.; west coast, 18s. to 19s., f.a.s. Benzol, 90 per cent., casks included, London 8d., North 7¼d. to 7½d.; 50-90 per cent., casks included, London 7¾d., North 7d. to 7¼d. Toluol, casks included, London 8d., North 7¼d. to 7½d. Crude naphtha, in bulk, London 3½d. to 3⅝d., North 3¼d. to 3⅜d.; solvent naphtha, casks included, London 10d. to 10¼d., North 9d. to 9¼d.; heavy naphtha, casks included, London 9⅜d. to 10¼d., North 8¾d. to 9d. Creosote, in bulk, London 2¼d. to 2⅜d., North 2⅛d. Heavy oils, in bulk, 2⅜d. Carbolic acid, 60 per cent., casks included, east coast 1s. 5½d. to 1s. 5¾d., west coast 1s. 5¼d. to 1s. 5½d. Naphthalene, £4 10s. to £8 10s.; salts, 32s. 6d. to 35s., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article is quiet. Prices have gradually declined throughout the past week, and sales are difficult to negotiate for prompt or forward. In London, the principal London Gas Companies have reduced their price to £12 2s. 6d., Beckton terms; but outside makers are selling at considerably under this. In Hull, business has been done at £11 17s. 6d. for the best makes, and £11 15s. for ordinary; while in Liverpool £11 17s. 6d. to £12 has been accepted. In Leith, makers are very well sold, and are independent of the market to a great extent. They quote £12 5s.; but the value is not more than £12 to £12 2s. 6d.

COAL TRADE REPORTS.

Lancashire Coal Trade.

During Whit week in Lancashire, except in some isolated instance, such as at Bolton this year, there is no business doing of any kind. Coal is not an exception. There has been nothing doing, and only to-day can it be said that labour is being resumed. Prices of coal are unchanged. Supplies on contract have to be sent out, but of that the quantity is infinitesimal in Whit week. The same, or nearly the same, conditions prevail in Yorkshire and the Midlands. Colliers have only been working at most half the week. Wise users got their supplies a week or a fortnight ago; but there are ample orders in hand to be executed when the ability to serve them is at hand. In the Barnsley district, nothing has been done with regard to railway contracts. Gas coal is said to be only in small request.

Northern Coal Trade.

There is a quieter tone in the coal trade of the North, but some local holidays are expected to give it a slight stimulus before the end of the month. In steam coals, the output is well taken up; but for forward delivery, prices show a little ease. Best Northumbrian steams are quoted from about 13s. 6d. to 13s. 9d. per ton f.o.b. For second-class steams, the quotation varies from about 11s. 6d. to 12s. 3d., and steam smalls are quiet at from about 5s. 6d. to 7s. In the gas coal trade, there is the ease which is often seen at this season—the time of the lowest consumption of the year. The home use is now very limited; but the exports are heavy, and the home trade may show some recovery next month. Durham gas coals vary in current quotation from about 10s. 3d. to 11s. 6d. per ton f.o.b. for general qualities, with "Wear specials" at 12s. to 12s. 3d. As to contracts, fewer are now in the market. That for Magona has been settled, at about the price previously hinted—near 16s. 9d. per ton, delivered at the port, Porto Vecchio. Some other small contracts are under discussion. The coke market is quiet; but the lessened production of gas coke has steadied it. Good gas coke is quoted from 15s. to 15s. 6d. per ton f.o.b.

Scotch Coal Trade.

Trade is not so active; the demand for shipping having lessened. The home request for round coal has kept up, and there is a slight

improvement in the inquiry for larger sizes of small stuff. At present, however, the market is not sufficiently strong to keep the collieries fully going. The prices quoted are: Ell 10s. 6d. to 12s. 6d. per ton f.o.b. Glasgow, splint 10s. 9d. to 11s., and steam 10s. 3d. to 10s. 6d. The shipments for the week amounted to 229,269 tons—a decrease of 71,759 tons upon the preceding week, and of 49,947 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,656,265 tons—a decrease of 406,356 tons upon the corresponding period of 1907.

New Water-Reservoir for Bolton.

The new water-reservoir to be constructed at Delph for the Bolton Corporation, which is estimated to cost about £300,000, will have a capacity of 500 million gallons. The site of the new water-works scheme comprises 1700 acres of land; and the work, which will extend over four or five years, is being carried out from plans prepared by Mr. R. H. Swindlehurst, M.Inst.C.E., the Water Engineer, and Mr. Lewin Mitchell, his Assistant. The embankment will have a total length of 2781 feet; its base will cover an area of 15 acres; and its maximum width and height will be 400 feet and 100 feet respectively. It will be 25 feet wide on the top, and will contain more than 400,000 cubic yards of earthwork, formed in layers 12 inches deep and thoroughly consolidated. The ceremony of cutting the first turf took place recently in the presence of a numerous company, including many members of the Town Council. Mr. J. T. Cooper, the Chairman of the Water Committee, was presented with a silver spade with ebony handle as a *souvenir* of the occasion; and Mr. Rimmer, the Vice-Chairman, was made the recipient of a silver rose-bowl, suitably inscribed. Mr. Cooper, in the course of his address to the company, said the demands on the Water Department were rapidly growing; but he added that it was reassuring to know that, under ordinary circumstances, the requirements of the town and the area of supply would be met for nearly half-a-century to come by the extensions now being carried out.

Tipton Gas Undertaking.

The accounts of the gas undertaking of the Tipton Urban District Council for the year ending the 31st of March last have been issued. They show that the sale of gas produced £14,840, compared with £14,388 in 1906-7; residual products, £4945, against £4267; and that the total revenue was £19,828, against £18,674. The expenditure on the manufacture of gas was £10,189, compared with £10,065; on distribution, £594, against £576; on lighting and repairing public lamps, £470, against £395; and the total expenses were £12,536, compared with £12,426. The £470 charged for the public lighting includes the cost of fitting the automatic lighting apparatus (now completed) and new lamps. The balance carried to the profit and loss account is £7292, against £6248 before; and after meeting interest and sinking fund charges there is a net surplus of £2541 added to the accumulated profits account, bringing it up to £6298. In the manufacturing statement, the Engineer and Manager (Mr. Sidney O. Stephenson) furnishes the following particulars: Coal carbonized, 10,952 tons; gas made, 129,365,000 cubic feet (including 710,000 cubic feet of water gas); gas made per ton, 11,812 cubic feet; sold and used on works, 113,554,950 cubic feet; and loss by leakage, condensation, &c., 15,669,050 cubic feet. The quantity of gas sold shows an increase of 5·29 per cent. and the leakage a decrease of 1·95 per cent. compared with the year 1906-7. The residuals produced last year were: Coke and breeze, 8297 tons; tar, 129,038 gallons; and ammoniacal liquor (10-oz.), 267,178 gallons. Worked out per ton of coal, the figures are: Coke and breeze, 15 cwt.; tar, 11¾ gallons; and ammoniacal liquor, 24½ gallons.

Hebden Bridge and Mytholmroyd Gas Board.

The twelfth annual report and balance-sheet of the Hebden Bridge and Mytholmroyd Gas Board shows that the gross profit for the past financial year amounts to £4808, and the net profit to £1030, as against £782 for the previous year, or an increase of £248. The amount of stock issued and other capital borrowed to the end of the year was £86,300. Towards the liquidation of this sum £15,421 has been set aside, in accordance with the provisions of the Board's Act of 1895; while the profits accumulated from the date of the taking over of the undertaking from the old Company to March 31 this year amount to £6285, after deducting a sum of £1550 of profits appropriated and paid to the two Urban District Councils, and allocating £1216 to the repairs and renewals fund, and applying to capital purposes a sum of £1356 for expenditure in excess of the amount borrowed—making altogether the sum of £25,829, which has been set aside out of revenue. The total capital expenditure to date amounts to £91,623. The report states that the working results are satisfactory. The gas made per ton was slightly less; but the illuminating power of the gas was increased from 18·08 to 18·14 candle power, as against the 15 candles required by the Act. The total gas manufactured shows an increase of 4,277,000 cubic feet; and there was an increased sale of 5,752,200 cubic feet. The Manager (Mr. E. J. Wellens) remarks that the price of coal was advanced 2s. 6d. per ton; but, fortunately for the Board, they had a good quantity to come in on the old contract at the lower price, and therefore only purchased at the higher rate 5000 tons, instead of 7000 tons which would otherwise have been required. The Board, when considering the report, resolved to pay £250 out of the profits to the Hebden Bridge and Mytholmroyd Councils in proportion to their respective interests. In referring to the matter, the "Halifax Courier" says: "The real success of the year's working can only be grasped when it is known that the gas-works are very unsatisfactorily situated. Extensions are needed; and because of the present situation (near to the Lancashire and Yorkshire Railway), they cannot be made. Yet Mr. Wellens contrives to increase the output. Further, the Hebden Bridge Council have an electricity plant which is rapidly gaining patronage; yet in spite of this there seems no check to the Board's progress."

Messrs. Cory and Son and "Coalite."

At the annual meeting of Messrs. William Cory and Son, Limited, last Thursday, the Chairman (Sir Francis Cory-Wright, Bart.), when addressing the shareholders, remarked that he presumed he would be expected to say something as to "Coalite." He was not a Director of the Coalite Company; but he would deal with the position as he understood it. A Company had been formed for the manufacture of "Coalite." Their works at Wednesfield were in operation; and there was a ready sale in the district for all the "Coalite" that was at present being manufactured. None was being sent to London, because it was all sold in the neighbourhood. The British Coalite Company, however, were now erecting very large works at Barking; and he was informed that they expected, before the winter set in, to have a very large quantity for William Cory and Son, Limited, to distribute to the Coalite Company's customers. When the "Coalite" came, they would know how to deal with it; but until it did come, it did not trouble the Directors one way or the other. Personally, he believed there would be a great demand for it when the fuel was ready, because it was perfectly smokeless and very hot. As he said last year, if it were going to be a success, as the people concerned anticipated, and as he had no doubt it would, it would be a very great mistake for their Company not to be mixed up with it; and if it did come along, they would do their best for the Company, who had entrusted them, not only to buy their coals, but to sell the "Coalite" when it was made.

Quality of the Gas at Manchester.

The Gas Committee of the Manchester Corporation have considered a complaint with regard to the quality of the gas supply and the lighting of St. Thomas's Church; and Alderman Gibson has since replied that the inspectors on visiting the church found the system of illumination was most defective. He says it is not correct "that it has been acknowledged officially that the candle power of the gas supplied has been much diminished for some time past." Manchester is not under any legal restriction to supply gas of any given illuminating power. The standard illuminating power prescribed for London is 14-candle power; while in Manchester, without any legal restriction at all, over 17-candle power is given. It is not correct to say the "bad quality" of the gas "at present supplied is such that the clergy, the choir, and the congregation are not able to read as they should the books in use in the church." The general arrangements and the neglected and defective burners and fittings are at fault, not the gas. Any well-informed man knows that large profits are made on the gas undertaking; and such profits are used in relief of rates to the extent of nearly 4d. in the pound. This profit is not made out of gas of inferior quality. The supply of "bad gas" would spoil the gas business, as bad material would spoil any other business, and would not make the profit required. At a vestry meeting of St. Thomas's Church, Canon Nunn is reported to have said, among other incorrect things, "that complaints of the inferior gas in the city were 'universal.'" This is an exaggeration, as out of 165,000 gas consumers there are very few complaints indeed as to the quality of the gas; and where such complaints are made, in every case, where the fittings, globes, burners, &c., were cleaned and put in proper condition the light became satisfactory. At the same meeting the statement was made that the poor suffered most owing to the "costly appliances needed to secure the incandescent light." The appliances are not costly, a few pence will secure them; and strange to say no complaints are made by poor people. As a rule, such people keep their fittings in good order.

Charge of Fraud at Southampton.—At a special sitting of the Winchester County Bench last Friday, Mr. Charles James Haines, late Resident Engineer at the Southampton Water-Works at Otterbourne, was charged on various counts with having obtained money by false pretences from the Corporation; and after a lengthy hearing, he was committed for trial at next month's Quarter Sessions. It was stated for the prosecution that the defendant, who had to prepare time-sheets for certain work, wrongfully included therein as a labourer a boy who was engaged by him as house boy at 4s. 6d. a week. Thus the lad was credited with a guinea a week, which was paid to him by Mr. Haines's directions, and then handed by the boy to the defendant. The lad, it was argued, was in reality never in the employ of the Corporation. The defence was that the amount of a guinea a week was charged because Mr. Haines's own pony was engaged on the work with the lad; and that there was no intention whatever to defraud. The Corporation, it was urged, had had their money's worth.

Copenhagen Water Supply.—The water supply of Copenhagen is derived from 5-inch wells bored through glacial deposits overlying a stratum of chalk, to or into which the borings extend. Upon reaching the chalk, if it be found covered with coarse material, the well is not pushed farther; but should the covering layer be of fine grain, the boring is extended into the body of the chalk itself. The water supply of the capital of Denmark was the subject of a paper recently read by Dr. W. P. Mason before the American Water-Works Association. According to an abstract in "Engineering Record," the wells are from 150 to 200 feet deep, and are sunk at an expense of about $1 per foot. The water is very hard, and is softened by private plants for industrial uses. The city, however, removes only the iron carbonate, which amounts to 4·1 parts per million. This is accomplished by aëration and filtration. The water is delivered into open cast-iron troughs, 24 in number, each 12 feet long, 8 inches deep, and 8 inches broad. The water overflows and falls in thin sheets into the collecting-well, 8 feet below; the soluble iron being thereby oxidized to the insoluble form. It then flows 14 miles to the filter plant in the city. The rate of filtration on the 75 ft. by 150 ft. beds is 8 vertical inches per hour; and the depth of the sand is 4 feet. The only function of the filters is to remove the suspended iron. The filters are cleaned every nine days, except during the winter, when the time is extended to about 40 days by breaking up the "Schmutzdecke" with rakes without removing the water. It has been proposed to increase the time between the cleanings by passing the water rapidly through small "roughing" filters of gravel and small stones before it flows upon the filters.

Quality of St. Helens Gas.—In the "JOURNAL" last week (p. 651), we gave the results of the working of the gas undertaking of the St. Helens Corporation for the year ending the 31st of March. Among other particulars, it was mentioned that the illuminating power of the gas was equal to 18 standard candles. The Engineer and Manager (Mr. S. Glover) is to be congratulated on the quality of his gas in other respects, as shown by the following figures giving the average, in grains per 100 cubic feet, of the monthly reports (24 tests): Sulphur—maximum, 11·5; minimum, 9·8; mean, 10·6. Ammonia—maximum, 0·7; minimum, 0·4; mean, 0·5. The maximum quantity of sulphur in the gas in the year (in January) was 13·9 grains per 100 cubic feet; the minimum (in July), 8 grains. The maximum and minimum quantities of ammonia (in October) were 1 grain and 0·2 grain respectively.

The Tarring of Roads.—The Borough Surveyor of Burton-upon-Trent has reported to the Public Works Committee of the Corporation on his experiments in tar painting. He states that the whole length of Derby Road within the borough was painted with tar—a portion on April 13 and the remainder on May 11, 12, and 13. The work done on the first-named day did not appear so good as that carried out subsequently; but the rest of the road seems quite satisfactory. The total area of road treated is 10,317 square yards, and the cost was £29 3s. 5d., or 0·67d. per square yard. One gallon of tar covered 8 square yards of surface. The Surveyor has been instructed to tar-paint a length of road where there is a great deal of motor traffic, at a cost of between £40 and £50. The Cuckfield Urban Council are reported to be in trouble with Sussex farmers because they have tarred the roads to abolish the dust nuisance. The farmers say the tar is washed into their ponds with the surface drainage, to the danger of the lives of the cattle. They declare that it has killed the fish in most of the ponds; and they have agreed to appoint a Committee to inquire into the matter.

The Charge for Water in the City of London.—Our readers are aware that, under the powers conferred by the Metropolis Water Act, 1902, the Metropolitan Water Board have increased the charge for water in the City. Consumers are strongly objecting to this, and one of them (Mr. Vivian Samuel) has explained, in a letter to an evening contemporary, a novel scheme of passive resistance which he advises others to put into practice. He says: "I have in one of my branches a supply of water, which is used by four assistants besides myself; and I have just received from the Metropolitan Water Board a notice that the charge has been increased to £18 7s. 2d. per annum for that supply. This works out at 1s. 2d. a day at six days a week; the water consumed being, I estimate, about 10 gallons per day. . . . The New River Company charged £2 14s. per annum; but upon the Metropolitan Water Board taking over the Company, the rate was increased to £10 6s. 4d. Now the last straw, and a pretty heavy one, has been added to the burden. . . . As a protest against their action, I have given notice to the Board to cut off the water supply from my premises; and I intend to buy distilled water, which will cost me only a few pence per week for the small quantity I require."

Progress of the Exeter Water-Works.—A very satisfactory report as to the past year's working of the water undertaking was presented to the Exeter City Council at their meeting last Wednesday. The income for the twelve month ending the 31st of March from water-rents, meter-rents, and water for building amounted to £15,879, compared with £15,553 in the year 1906-7—an increase of £326. The expenditure on coal decreased from £431 to £227; and there was also considerable economy in the outlay on renewals and repairs to works—the charges under this head being reduced from £1699 in 1906-7 to £1190. Against these savings, however, there had been several exceptional charges upon the income of the undertaking. After payment of interest and sinking fund, the net profit was £1884. The Water Committee recommended that the whole of this sum should be transferred to the general district fund. Alderman Wreford, who moved the adoption of the report, said the sum of £1884 was a record payment in relief of rates in any one year since the Council acquired the water undertaking in 1878, and it had been earned in spite of certain exceptional expenditure. During the past three years, the water-works had contributed from profits £4585 to the district fund.

Failures of Incandescent Mantle and Burner Makers.—A statutory meeting of creditors of Mark Morris Shapnizky (trading as M. Morris and Co.), incandescent mantle dealers, &c., of 40, Middlesex Street, E., was held at the London Bankruptcy Court last Wednesday. The Official Receiver said the debtor estimated his liabilities at £2600, and his assets at £1000. He is a Russian Pole, and came to England in 1892. Ten years later he went into partnership with his father-in-law, who was an incandescent mantle dealer. The latter retired in 1906, paid his liabilities in full, and left the goodwill of the business to the debtor, who subsequently opened additional shops in Houndsditch and Upper Street, Islington. The turnover for the last two years was £8000. The debtor attributed his failure to increased competition, and also to a fire which had occurred at one of his shops. On March 13 a meeting of creditors was held, when an offer to pay 7s. 6d. in the pound was refused. Mr. E. H. Hawkins (Messrs. Poppleton and Appleby) was appointed Trustee, with a Committee of Inspection. The statutory meeting of the creditors interested in the failure of William George Temple and Frank Bainbridge Mills, manufacturers of incandescent burners, was held a few days ago, at the London Bankruptcy Court, before Mr. Egerton Grey, Official Receiver. For the past two years the debtors had been engaged in the manufacture of the "Howelite" gas-burner, for acquiring the patent rights in regard to which a Company was formed, but had never gone to allotment. It was stated to be owing to their being unable to get payment for their outlay in respect of the burner and the formation of the Company that the debtors were in the Bankruptcy Court. The liabilities were estimated at £1246, and the assets were returned at £1760. A request was made for an adjournment, to allow of a proposal being submitted for a composition. But it was not granted. Eventually Mr. A. F. Whinney was appointed Trustee of the estate, to act in conjunction with a Committee of Inspection.

Visitors to London

FOR

The Institution of Gas Engineers Meeting

or

The Franco-British Exhibition.

THE "BLAND" LIGHT SHOW-ROOMS

Are open for Inspection.

The Bland Light Syndicate, Limited, will be happy to welcome visitors and to show the latest development of their widely known and beautiful Inverted Burner. The Gas Exhibit at The Franco-British Exhibition is outlined with the Bland Burner (as illustrated) with great effect, and should be seen after dark.

THE "BLAND" LIGHT FOR BRILLIANCE AND ECONOMY.

63, Queen Victoria St., London, E.C.

TELEPHONE 9239 LONDON WALL.

Our readers are aware that Messrs. James Simpson and Co., Limited, have for many years been closely identified with the manufacture of pumping machinery and all appliances relating to water-works. The nature and extent of their operations in this connection are effectively evidenced in a catalogue they have recently issued.

Messrs. Firth Blakeley, Sons, and Co., Limited, have recently completed a new steel tank and gasholder for the Sanquhar (N.B.) Town Council, who afterwards gave them an order for a set of four purifiers 6 feet square, the removal of the station meter, fitting a bye-pass to it, and putting down all new yard connections. The firm have also just delivered a set of six steel annular condensers, and are building new retort-beds with regenerative settings on their improved Yuill principle, for the Abingdon Gas Company. They are renewing two arches of retorts (sevens) on their regenerative principle for the Tralee Urban District Council; and they have in hand the erection of three arches of retorts for the Cashel (Tipperary) Urban District Council. The Thornton Urban Council have ordered a single-lift gasholder (50 ft. by 20 ft.) and a set of 12-inch cast-iron vertical condensers.

Mr. John Sharp (Whitworth Scholar), of 28, Burnbank Gardens, Glasgow, for many years responsible Engineer and Works Manager to Messrs. R. Laidlaw and Son, Limited, Gas and Water Engineers, Glasgow, has decided to devote the whole of his time to such consultative work, owing to the many calls made upon him for advice in engineering matters. In that capacity he will undertake the inspection and valuation of all kinds of engineering plant, and to co-operate with engineers and managers in carrying out the reconstruction or extension of their works. During his long connection with the above firm, Mr. Sharp has patented several important improvements in gas and hydraulic plant, including the well-known rotary exhauster made by them during late years, several of which have been supplied and erected at the Granton Gas-Works of the Edinburgh and Leith Gas Commissioners, and at the Saltley Gas-Works for the Birmingham Corporation Gas Department, &c., &c. His extended practical experience and scientific attainments should be a sufficient guarantee that all work entrusted to him shall be carried out in a thoroughly practical and business-like manner.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 686.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 10	10	Alliance & Dublin 10 p.c.	19–20	..	5 0 0
268,324	10	,,	7	Do. 7 p.c.	13–14	..	5 0 0
310,000	Stk.	Jan. 16	4	Do. 4 p.c. Deb.	100–103	..	3 17 8
200,000	5	May 29	6½	Bombay, Ltd.	6–6¼	..	5 0 0
40,000	5	,,	6½	Do. New, £4 paid	4¼–4⅜	..	5 9 6
50,000	10	Feb. 27	14	Bourne- mouth Gas and Water — B 7 p.c.	27–28	..	5 0 0
51,810	10	,,	7	Do. Pref. 6 p.c.	16½–16⅝	..	4 3 7
53,200	10	,,	6		14–15	..	4 0 0
380,000	Stk.	,,	12½	Brentford Consolidated	240–245	..	5 2 1
300,000	,,	,,	9½	Do. New	180–185	..	5 2 8
50,000	,,	,,	5	Do. 5 p.c. Pref.	118–123	..	4 1 4
206,250	,,	June 12	4	Do. 4 p.c. Deb.	98–103*	..	3 17 8
220,000	Stk.	Mch. 12	11½	Brighton & Hove Orig.	202–207	..	5 8 8
246,320	,,	,,	8½	Do. A. Ord. Stk.	152–157	..	5 5 1
460,000	20	Mch. 27	10	British	41½–42½	..	4 14 1
104,000	Stk.	Feb. 13	6	Bromley, Ord. 5 p.c.	116–119	..	5 0 10
165,700	,,	,,	4½	Do. do. 3½ p.c.	86–89	..	5 1 2
500,000	10	May 14	7	Buenos Ayres (New) Ltd.	10¾–11¼	..	6 4 5
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb.	93–95	..	4 4 3
150,000	20	Mch. 12	7½	Cagliari, Ltd.	24–25	..	5 16 0
100,000	10	—	—	Cape Town & Dis., Ltd.	4–6	..	—
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	5–7	..	6 8 7
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	46–48	..	6 5 0
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	92–94	..	4 15 9
157,150	Stk.	Feb. 27	5	Chester 5 p.c. Ord.	111–113	..	4 8 6
1,493,280	Stk.	Mch. 12	5⅜	Commercial 4 p.c Stk.	104–109	..	4 15 5
560,000	,,	,,	5	Do. 3½ p.c. do.	100–105	..	4 15 3
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	82–84	..	3 11 5
800,000	Stk.	June 12	6½	Continental Union, Ltd.	112–117*	..	5 11 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	136–141*	–½	4 19 3
460,170	Stk.	—	5½	Derby Con. Stk.	121–123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
148,995	,,	Mch. 31	5	East Hull 5 p.c. Ord.	100–103	..	4 17 1
486,090	10	Jan. 30	12	European, Ltd.	23–24	..	5 0 0
354,060	10	,,	12	Do. £7 10s. paid	16½–17½	..	5 2 10
15,182,590	Stk.	Feb. 13	4⅛	Gas- light and Coke — 4 p.c. Ord.	95–97	+½	4 10 10
2,600,000	,,	,,	3½	3½ p.c. max.	87–90	..	3 17 9
3,799,735	,,	,,	4	4 p.c. Con. Pref.	106–109	..	3 13 5
4,193,975	,,	June 12	3	3 p.c. Con. Deb.	83–85*	+½	3 10 7
258,740	Stk.	Mch. 12	5	Hastings & St. L. 3½ p.c.	93–95	..	5 2 0
82,500	,,	,,	6½	Do. do. 5 p.c.	112–115	..	5 13 1
70,000	10	Apl. 29	11	Hongkong & China, Ltd.	18–19	..	5 15 9
4,940,000	Stk.	May 14	8	Imperial Continental	179–181	+½	4 8 4
473,600	Stk.	Feb. 13	3½	Do. 3½ p.c. Deb. Red.	93–95	..	3 13 8
195,242	Stk.	Mch. 12	6	Lea Bridge Ord. 5 p.c.	113–118	..	5 1 8

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Feb. 27	10	Liverpool United A	230–232	+3	4 6 2
718,100	,,	,,	7	Do. B	165–167	+1	4 3 10
306,083	,,	Dec. 30	4	Do. Deb. Stk.	106–108	..	3 14 1
152,736	Stk.	Feb. 13	7⅞	Maidstone 5 p.c.	136–141	..	5 8 2
75,000	5	Nov. 28	6†	Malta & Medn., Ltd.	4¼–4⅜	..	6 6 4
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	100–102	..	4 18 0
250,000	100	,,	4⅜	Melbourne 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	May 29	3½	Monte Video, Ltd.	11–12	..	5 16 8
1,775,892	Stk.	Feb. 27	4⅝	Newc'tle & G'tesh'd Con.	107–109	+½	4 4 10
418,460	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	90–91	–⅛	3 16 10
15,000	10	Feb. 27	10	North Middlesex 10 p.c.	20–21	..	4 15 3
55,940	10	,,	7	Do. 7 p.c.	13½–14½	..	4 16 7
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	140–143	..	5 11 11
60,000	5	Mch. 27	7	Ottoman, Ltd.	6–6½	..	5 7 8
398,490	5	Apl. 29	7	Primitiva Ord.	5⅞–6⅛	+⅛	5 12 0
796,980	5	Jan. 30	5	Do. 5 p.c. Pref.	4¾–5	..	5 0 0
488,900	100	June 1	4	Do. 4 p.c. Deb.	91–93	..	4 6 0
1,000,000	10	Apl. 29	8	River Plate Ord.	12½–13½	..	5 18 6
312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	93–95	..	4 4 3
250,000	10	Apl. 10	8	San Paulo, Ltd.	13½–14	..	5 14 4
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	50–52	..	4 16 2
135,000	Stk.	Mch. 12	10	Sheffield A	245–247	..	4 1 0
209,984	,,	,,	10	Do. B	245–247	..	4 1 0
523,500	,,	,,	10	Do. C	245–247	..	4 1 0
70,000	10	May 29	10	South African	14–15	..	6 13 4
6,429,895	Stk.	Feb. 13	5⅜	South Met., 4 p.c. Ord.	118–120	..	4 8 10
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	84–86	..	3 9 9
209,820	Stk	Mch. 12	8	South Shields Con. Stk.	154–156	..	5 2 7
605,000	Stk.	Feb. 27	5⅓	S'th Suburb'n Ord. 5 p.c.	116–119	..	4 9 7
60,000	,,	,,	5	Do. 5 p.c. Pref.	118–121	..	4 2 8
117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	120–125	..	4 0 0
502,310	Stk.	May 14	5	Southampton Ord.	105–110	..	4 10 11
120,000	Stk.	Feb. 27	6⅔	Tottenham A 5 p.c. and B 3½ p.c. — Edmonton 4 p.c. Deb.	20–125	..	5 8 0
398,940	,,	,,	5¼		104–106	..	4 19 1
149,470	,,	Dec. 13	4		59–62	..	3 18 5
182,380	10	June 12	8	Tuscan, Ltd.	10–10⅛*	..	7 12 4
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	99–101	..	4 19 0
193,742	Stk.	Feb. 27	5	Tynemouth 5 p.c. max.	106–107	..	4 13 6
255,636	Stk.	Feb. 13	6½	Wandsworth B 3½ p.c. and 3 p.c. Deb. Stk — Putney	128–133	..	4 17 9
80,075	,,	Dec. 30	3		73–78	..	3 16 11
845,872	,,	Feb. 27	5½	West Ham 5 p.c. Ord.	100–102	..	5 0 6
185,000	,,	,,	5	Do. 5 p.c. Pref.	120–125	+3⅛	4 0 0
228,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	102–107	..	3 14 9

Prices marked * are "Ex div." † Next dividend will be at this rate.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situation Vacant.

FOREMAN. No. 4954.
LADY FOR SHOW-ROOM, &c. Portsea Island Gas Company.
SALESMAN (GAS COMPANY'S SHOW-ROOM). No. 4953.

Situations, &c., Wanted.

MAIN AND SERVICE LAYER, &c. Voller, Burgess Hill.
REPRESENTATION (GAS PLANT FIRM). No. 4945.
SECRETARYSHIP. A. L. Griffith, 46, Queen Victoria Street, E.C.

Plant (Second-Hand), &c., for Sale.

AIR-COMPRESSOR. Mid Kent Gas Company.
CONDENSERS, ENGINES AND EXHAUSTERS, SCRUBBERS, PURIFIERS, RETORT-HOUSE FITTINGS, &c. Ellis, Etruria Works, near Stoke.
PLANT, MACHINERY, &c. (LAMP MANUFACTURERS). Anderson and Duffield, Slough and London.
PUMPING PLANT, &c. Berkhampstead Water Company.
PURIFIER VALVES. Malton Gas Company.

Capital Wanted. No. 4946.

Patents for Disposal or Licences to Work.

EXTRACTION OF AMMONIA, &c. Haseltine, Lake, and Co., Southampton Buildings, W.C.

Stocks and Shares.

MELTON MOWBRAY GASLIGHT AND COKE COMPANY. June 23.
TOTTENHAM AND EDMONTON GAS COMPANY. July 6.

TENDERS FOR

Benzol.

HEYWOOD GAS DEPARTMENT. Tenders by June 23.

Coal and Cannel.

ALTRINCHAM GAS COMPANY. Tenders by June 22.
ATHERTON URBAN COUNCIL. Tenders by June 24.
BLACKPOOL GAS DEPARTMENT. Tenders by June 29.
COLWYN AND COLWYN BAY GAS DEPARTMENT. Tenders by June 24.
DONCASTER GAS DEPARTMENT. Tenders by July 10.
EXMOUTH GAS COMPANY. Tenders by June 27.
GODSTONE UNION. Tenders by June 22.
HOLYHEAD AND NORTH WALES GAS AND WATER CORPORATION. Tenders by June 24.
KESWICK GAS COMPANY. Tenders by June 25.
LIMERICK GAS DEPARTMENT. Tenders by June 29.
LURGAN GAS COMPANY. Tenders by July 6.
MARKET HARBOROUGH GAS DEPARTMENT. Tenders by June 27.
MARPLE GAS DEPARTMENT. Tenders by July 1.
NEWRY GAS DEPARTMENT. Tenders by June 26.
PONTEFRACT GAS DEPARTMENT. Tenders by June 20.
SHAFTESBURY GAS COMPANY. Tenders by June 24.
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 27.
TEIGNMOUTH GAS DEPARTMENT. Tenders by July 6.
TORQUAY GAS COMPANY. Tenders by June 23.

Coke.

SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 27.

Engine and Exhauster.

HAWORTH GAS DEPARTMENT. Tenders by June 29.

Oil for Gas Making.

LEEDS GAS DEPARTMENT. Tenders by June 20.
ROCHESTER, &c., GAS COMPANY. Tenders by June 24.

Purifying Plant.

DUNDEE GAS COMMISSIONERS. Tenders by July 18.

Lime.

SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 27.
MARPLE GAS DEPARTMENT. Tenders by July 1.

Sulphuric Acid.

EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by June 29.

Tar and Liquor, &c.

DONCASTER GAS DEPARTMENT. Tenders by July 10.
FARNWORTH AND KEARSLEY GAS COMPANY. Tenders by June 24.
KESWICK GAS COMPANY. Tenders by June 25.
MARPLE GAS DEPARTMENT. Tenders by July 1.
READING GAS COMPANY. Tenders by June 22.
ROCHESTER, &c., GAS COMPANY. Tenders by June 24.
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 27.

Messrs. S. H. & W. Hart, leather manufacturers, of Bermondsey and Glasgow, have recently been making large extensions of their premises in both places to enable them to cope with the increasing demands for their gas-meter leathers. There are no more exacting users of leather than makers of gas-meters; and it is accounted for by the severe tests and strains that meter leathers have to stand. Special knowledge and care are consequently required in their preparation and treatment, in order to satisfy meter makers.

The Pulsometer Engineering Company, Limited, of London and Reading, have just issued an attractive catalogue of their steam-pumps. In the earlier pages will be found a description of the pump, an explanation of its action, and an indication of its capabilities. Illustrations of the pump and of the methods of slinging it follow; and then come the prices and particulars. The varied applications of the pump are well shown in a number of excellent reproductions of photographs which occupy the final pages of the catalogue.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in advance. If credit is taken, the charge is 25s. a year.

Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

"ILLUMINATING TRUTHS."

LEAFLETS FOR DISTRIBUTION.

No. 1.—"The Sanitary Aspects of Gas and Electric Lighting."
No. 2.—"The Cleanliness of Illuminants: The Eyesight."
No. 3.—"Fire Risks."
No. 4.—"The Relative Cost of Gas and Electricity, and Matters affecting it."
No. 5.—"On Reliability, with Instances of Misplaced Confidence."
No. 6.—"On Shop Lighting, with Special Reference to the Flame Arc Lamp."
No. 7.—"The Osram Lamp: Fiction and Fact."

This series of Leaflets will be useful, not only for distribution among Householders generally, but for circulation among Shareholders to fortify them with arguments in defence of the commodity in which they have invested capital. Copies of each Leaflet should also be kept in every Gas Undertaking's Show-Rooms.

Prices for Quantities on Application to WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

BROTHERTON & CO., LIMITED.
Offices: City Chambers, LEEDS.
Correspondence invited.

FIDDES-ALDRIDGE
SIMULTANEOUS Discharging-Charger.
The one Machine which Discharges and Charges at One Stroke.
See Advertisement, May 26, p. III. of Centre.
ALDRIDGE AND RANKEN,
9, VICTORIA STREET, WESTMINSTER, S.W.
Telegrams: "MOTORPATHY, LONDON." Telephone: 5118 WESTMINSTER.

AMMONIA.
Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

GAZINE—A radical Solvent and Pre- ventative of Naphthalene deposits, and the Automatic cleaning of Mains and Services.
It is also used for the Enrichment of Gas, and has an illuminating value double that of 90 per cent. Benzol.
Supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

BENZOL
AND
CARBURINE FOR GAS ENRICHING.
ALSO
THE MAXIM PATENT CARBURETTOR.
For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.,
7, BISHOPSGATE STREET WITHOUT,
LONDON, E.C.
Telegraphic Address: "Carburine, London."

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

THE KEITH LIGHT.
4800 INSTALLATIONS NOW IN USE.
SEE illustrated advertisement in next week's issue.
JAMES KEITH AND BLACKMAN CO., LTD., 27, Farringdon Avenue, LONDON, E.C.

DELLWIK-FLEISCHER WATER GAS.
BLUE WATER GAS, CARBURETTED WATER GAS, SELF-CARBURETTING.
FOR Particulars of Annual Generating Capacity of Plants built or in course of construction, see advertisement in the "JOURNAL" for June 2, p. 545.
The DELLWIK-FLEISCHER WATER GAS SYNDICATE, Belgravia Chambers, 72, Victoria Street, Westminster, LONDON, S.W. Telegraphic Address "Dellwik, London."

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.
SPECIALLY prepared for the Manu- facture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

LUX'S GAS PURIFYING MASS
See Advertisement on p. 725.
FRIEDRICH LUX, LUDWIGSHAFEN-AM-RHEIN.

BY adopting Cripps's Bye-Pass Valves inside your Purifiers, you can relieve the Back-Pressure in the Lower Tiers when the Purifying Material gets hard. They are extremely useful and economical.
Sole Makers: C. & W. WALKER, LIMITED, Midland Iron-Works, Donnington, near Newport, SHROPSHIRE.

BRISTOL RECORDING GAUGES AND THERMOMETERS.
J. W. & C. J. PHILLIPS, 23, COLLEGE HILL, LONDON, E.C., and 7, PARK SQUARE, LEEDS.

SULPHURIC ACID.
SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: OLDBURY, WEDNESBURY, AND STAFFORD.
Address Correspondence and Inquiries to OLDBURY WORCS.
Telegrams: "CHEMICALS, OLDBURY."

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers,
Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

PINCHBECK'S Meters and Burglar PROOF STRONG BOX.
See illustrated advertisement, May 26, p. I. of Centre.
J. PINCHBECK & Co., Adams Place, George's Road, HOLLOWAY, N.

AMMONIACAL Liquor wanted.
CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.
Telegrams: "CHEMICALS."

TO Gas Managers, &c., Wanted, Old Condemned GAS-METERS, from 1-light to 1000-light, for destruction to re-claim Metals. Write for Prices, Stating Quantities and Sizes, and if Wets or Drys. Scrap Metals, Drosses, Metal Shop Sweepings, &c., also bought
J. WILSON, Pleasant Grove, York Road, King's Cross, LONDON, N.

AMMONIACAL Liquor wanted.
Address the CARDIFF ALKALI COMPANY, LIMITED, CARDIFF.

GAS OILS.
MEADE-KING, ROBINSON, & CO.
Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
73, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2336 HOLBORN.

"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

INSURANCE—H. F. LAMSDEN, Insurance Broker (Established 1888), 19 & 21, Queen Victoria Street, London, E.C., quotes BOTTOM LONDON RATES FOR EMPLOYERS' LIABILITY UNDER THE NEW ACT. Collective Fidelity Guarantee and THIRD PARTY, INCLUDING DAMAGE CAUSED BY GAS EXPLOSION, Marine, Fire, and Loss of Profit in case of Fire. Motor-Car, Boilers, Engines, Lifts, Cranes, all classes of Machinery, and Plant. Payment of Trade Acceptances and Open Credits Guaranteed. Excess Bad Debt Policies fixed on the most favourable Terms.

MR. Arthur L. Griffith, of No. 46, Queen Victoria Street, E.C., Secretary of the Society of British Gas Industries, is open to UNDERTAKE the SECRETARYSHIP of One or Two small Companies. Experience in Gas Companies' Accounts. Central Office, with Board Room.

EXPERIENCED Engineer, A.M.I.E.E., with Office at Westminster and Influential Connection, is open to REPRESENT, in London and South, a Firm having Good Gas Plant Specialities.
Address No. 4945, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MAIN and Service Layer. Young Man (Age 26) seeks Situation. Well up in Fixing Meters and Cookers, Handy at Repairs, can do Smithing, used to Meter Reading and Slot Collecting.
Address F. VOLLER, Hill Drop, Junction Road, Burgess Hill, SUSSEX.

GAS-WORKS EXTENSIONS.
H. BIRD, late with Messrs. Biggs, Wall, and Co., is open to CONTRACT for all kinds of Gas-Works Extensions and Repairs. Expert advice and Estimates given, and work carried out to Engineer's Drawings and Specifications. Retort Charging Machines a speciality. Patent Self-Discharging Scoop, 4 cwt. in one operation, For Sale.
Address H. BIRD, 101, Alexandra Road, HORNSEY, N.

WANTED, a Foreman for 150 Million Feet Gas-Works. Wages 50s. per week.
Apply, by letter, stating Age, Experience, and giving Three Testimonials, to No. 4954, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a First-Class Salesman with a thorough Knowledge of Gas Fittings, Burners, Cookers, Stoves, &c., to TAKE CHARGE of a Gas Company's Show-Rooms in a Large City.
Apply, by letter, Stating Experience and Age to No. 4953, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PORTSEA ISLAND GASLIGHT COMPANY, PORTSMOUTH.
WANTED, a Young Lady for the Com- pany's Kingston Road Branch. One acquainted with the Sale and Hiring of Gas Cooking-Stoves, also with the Sale of Gas-Fitting Appliances, &c. Preference given to one who has held a similar Position. Salary £65 per Annum.
Apply, in writing, to the undersigned, stating Age, how soon could commence duties, and with *copies* only of not more than Three recent Testimonials.
J. D. ASHWORTH, M.I.M.E.
Gas-Works, Portsmouth.

FOR SALE—Two Cripps's Bye-Pass PURIFIER VALVES. Size, 10-inch.
MALTON GAS COMPANY, Malton, YORKS.

FOR SALE—A Petrol Driven Portable AIR-COMPRESSOR for Testing Gas-Mains. Has been used for Testing High-Pressure Mains to 40 lbs. per square inch. In first rate Condition.
Full Particulars on Application to the MID KENT GAS COMPANY, Snodland, KENT.

WE have the following New and Over- hauled Second-Hand PLANT FOR SALE:—
Gasholder, 8500 cubic feet, New Steel Tank.
Gasholders, 35 ft. by 10 ft., Cast-Iron Tank.
" 45 ft. by 12 ft.
" 50 ft. by 15 ft. 4 in., Telescopic,
Overhauled and re-erected in new Steel Tanks.
8-inch, 9-inch and 10-inch Condensers.
Kirkham Washer (200,000 cubic feet per day).
Walker's Purifying Machine.
Exhausters and Engines, Single and Combined, 2000 to 60,000 feet per hour.
Scrubber, 7 ft. diameter, 55 ft. high.
Purifiers, sets 6-fts., 10-fts., 12-fts., and 20-fts.
Plans and Quotations of new Sets.
6-inch to 18-inch Station Meters, Governors, &c.
New Drums.
Tar and Liquor Pumps.
Producer-Gas Plants for 150 to 300 H.P.
Boilers, Tanks, and all requisites for Gas-Works.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY (Yorks.)

DISMANTLING of Gas Plant, Etruria, Staffordshire.
CONDENSER, 50 ft. high 3 ft. 6 in. diameter. By Walker's.
ENGINES and EXHAUSTER, 50,000 and 80,000 Cubic Feet per Hour each, with Valves, Regulators, &c. By Bryan Donkin and Co.
SCRUBBERS, by Walker's, 8 feet and 10 feet diameter, 59 feet body, 72 feet high, with Tar-Extracting Washer and Spiral Staircase.
PURIFIERS. Set of Ten, 30 ft. by 15 ft. by 5 ft.; with 24-inch Lutes, Valves, Lifting Gear, &c.
RETORT-HOUSE FITTINGS, GIRDERS, Wrought-Iron PRINCIPALS, 54 feet, 61 feet, and 67 feet Span, TURNTABLES, &c., &c.
JOHN ELLIS, Etruria Gas-Works, near STOKE; or MILES PLATTING, MANCHESTER.

PUMPING PLANT FOR SALE.
THE Berkhampstead Water Company are desirous of receiving Offers for Second-Hand PUMPING PLANT, as follows:—
A set of Two-Throw VERTICAL PUMPS by Gwynne, driven by Horizontal Compound STEAM-ENGINE. The Plant is capable of Pumping 12,000 Gallons per Hour.
A Worthington Triple-Expansion Condensing PUMPING-ENGINE to pump 24,000 Gallons per Hour.
The Plant may be inspected at the Water-Works, Berkhampstead, and any further Information obtained from Mr. A. F. PHILLIPS, 38, Parliament Street, WESTMINSTER, S.W.

THE Urban District Council of Atherton invite TENDERS for the Supply of about 7000 Tons of Screened GAS COAL or NUTS from the 1st of July, 1908, to the 30th of June, 1909.
Forms of Tender and further Information may be had from the undersigned, to whom Tenders should be delivered on or before Wednesday, June 24 inst.
W. GARNETT, Clerk.
June 12, 1908.

TENDERS FOR GAS COAL.
THE Gas Committee for the City of Limerick are prepared to receive TENDERS for 10,000 to 12,000 Tons of approved GAS COAL, delivered at their Works, Limerick.
Specification and Form of Tender to be had on Application to the undersigned.
Tenders, endorsed "Gas Coal," addressed to the Chairman, Gas Committee, Gas Office, William Street, Limerick, not later than Four p.m. on June 29, 1908.
By order,
M. FITZGERALD, Secretary.
Limerick, June 2, 1908.

BOROUGH OF HEYWOOD.
THE Gas Committee invite Tenders for approximately 7000 Gallons of BENZOL.
Specification and Form of Tender may be obtained upon Application to Mr. W. Whatmough, Gas Manager.
Sealed Tenders, endorsed "Benzol," to be sent to me not later than Tuesday, June 23, 1908.
By order,
GEO. G. BOUCHIER, Town Clerk.
Municipal Buildings, Heywood,
May 21, 1908.

COUNTY BOROUGH OF BLACKPOOL.
THE Gas Committee are prepared to receive TENDERS for the Supply of GAS COAL or COBBLES during the next Twelve Months, from July 1, 1908.
Tenders to be endorsed outside, and addressed to the Chairman by the 29th day of June, 1908.
Forms of Tender may be had from the undersigned.
JOHN CHEW, Gas Engineer.
Gas Offices, Princess Street,
June 5, 1908.

TORQUAY GAS COMPANY.
TENDERS FOR COAL.
THE Torquay Gas Company invite TENDERS for the Supply of about 12,000 Tons of GAS COAL, Screened or Unscreened, for Delivery during the Year ending the 31st of May, 1909.
Further Particulars, with Form of Tender, can be obtained on Application to the Manager, Mr. R. Beynon, Torquay Gas-Works, Hollacombe, Paignton.
The Company do not bind themselves to accept the lowest or any Tender.
Sealed Offers, endorsed "Tender for Coal," to be addressed to the Secretary, 58, Fleet Street, Torquay, on or before June 23, 1908.
R. P. KITSON, Secretary.
June 9, 1908.

READING GAS COMPANY.
TENDERS FOR TAR.
THE Directors of the Reading Gas Company invite TENDERS for the Purchase of their Surplus CARBURETTED WATER-GAS TAR, for One Year, commencing on the 1st of July next.
Specifications for the Contract will be forwarded on Application to the Engineer and Manager, Mr. Douglas H. Helps, Assoc.M.Inst.C.E.
Under the Conditions of the Contract, an allowance will be made for all water that may be found in the Tar in excess of 5 per cent.
Railway and River Communication direct to the Works.
Tenders, endorsed "Tender for Tar," and addressed to the undersigned, must be delivered not later than Monday, the 22nd inst.
The Directors do not bind themselves to accept the highest or any Tender.
A. CANNING WILLIAMS, Secretary.
159, Friar Street, Reading,
June 2, 1908.

GODSTONE UNION.
TENDERS FOR COAL AND COKE.
THE Guardians of the above-named Union invite TENDERS for the Supply of COAL and COKE for the Union Workhouse at Bletchingley, near Redhill, for One Year from the 1st of July next.
The average annual consumption has been:—
Best Screened Hetton Lyons Wallsend Coal, 230 Tons.
Nottingham Hard Steam Coal, 50 Tons.
Best Anthracite, 40 Tons.
Coke, 27 Tons.
Tenders for Coal and Coke to name price per Ton delivered (in sacks of 1 or 2 cwt.) at the Workhouse in such quantities and at such times as may be required.
Further Particulars can be obtained on Application to the Master of the Workhouse, or the undersigned.
Tenders, in sealed envelopes, endorsed "Coal Tender," to be sent to me on or before the 22nd inst.
The Guardians will not be bound to accept the lowest or any Tender.
EVELYN ALSTON HEAD, Clerk to the Guardians.
Union Offices, East Grinstead,
June 2, 1908.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.
SULPHURIC ACID.
THE Commissioners are prepared to negotiate for the Supply of about 2000 to 2500 Tons per Annum of SULPHURIC ACID over a period of One, Two, or Three Years, as may be mutually arranged.
Deliveries during November, December, January, and February require to be at the rate of about 70 Tons per week; other Months on a considerably reduced scale.
The Acid is required to be delivered in either Tank-Waggons or Carboys at the Commissioners' Railway Sidings, Granton, *via* Granton Harbour or Caledonian or North British Railways.
The Acid must be free from Arsenic, or nearly so; and the Contractors will be required to come under obligations as to deliveries, purity, &c.
Full Particulars may be obtained upon Application to Mr. W. R. Herring, M.Inst.C.E., General Manager, New Street Works, Edinburgh.
Sealed Tenders, marked "Tender for Sulphuric Acid," to be addressed to the Edinburgh and Leith Corporations' Gas Commissioners, 25, Waterloo Place, Edinburgh, and to be returned on or before Monday, June 29, 1908, at Ten a.m.
JAMES M'G. JACK, S.S.C., Clerk.
25, Waterloo Place, Edinburgh,
June 9, 1908.

The "TITAN."

THE MOST SUCCESSFUL INSTITUTION

of the Year in the Gas Cooker world is our celebrated

"TITAN" SLOT COOKER.

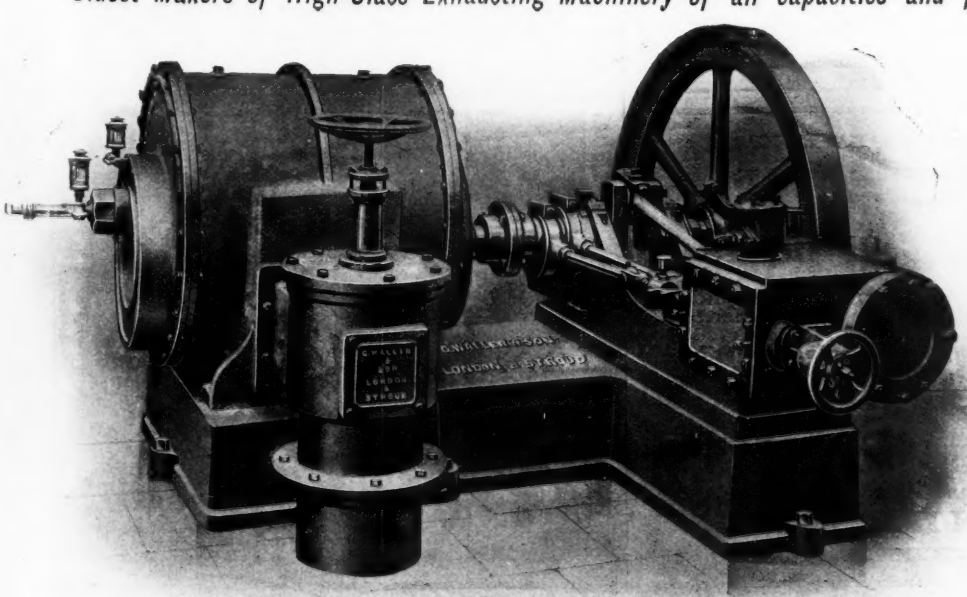
It is rapidly growing in favour with Consumers all over the Country, who are realizing that its many unique qualities make it superior to any other Slot Cooker on the Market.

If it is not on your List may we send you one for inspection?

ARDEN HILL & CO.,
ACME WORKS,
ASTON, BIRMINGHAM.

EXHAUSTING MACHINERY.

Oldest Makers of High-Class Exhausting Machinery of all capacities and for all purposes.



WALLER'S 3 & 4 BLADE EXHAUSTERS

require less steam and maintain a steadier gauge than any other type.

Over 1200 supplied.

GAS VALVES, COKE BREAKERS, PUMPS

For Tar, Liquor, or Water.

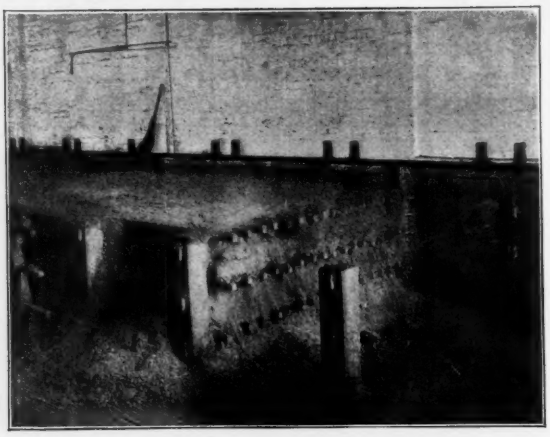
80,000 "E" Type Set, with Expansion Gear (for high-pressure steam).

GEORGE WALLER & SON, ENGINEERS, PHŒNIX IRONWORKS, STROUD, GLOUCESTERSHIRE.

London Office: 165, QUEEN VICTORIA STREET, E.C.

Telegrams—London: "Weighbeam, London." Stroud: "Waller, Brimscombe." Telephone—London: No. 2420 Central. Works: No. 210 Brimscombe.

PATENT "STANDARD" GRIDS



Extract from Report of the Wales and Monmouthshire District Institution of Gas Engineers and Managers Meeting at Cardiff:—

"As to the other recent developments, it may be stated that 'STANDARD' Grids have been fitted to Three Sets of Purifiers and that thus the Pressure is Lightened and the necessity of extending the Purifying Plant averted for the present."

KIRKHAM, HULETT, & CHANDLER, LIMITED,

Telegraphic Address: "WASHER LONDON." **131-2, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.** No. 127 VICTORIA.

LEAD WOOL
FOR
STRENGTH & ECONOMY.

A Contractor, writes:

"I am agreeably surprised at the results of your Lead Wool which before using I was prejudiced against."

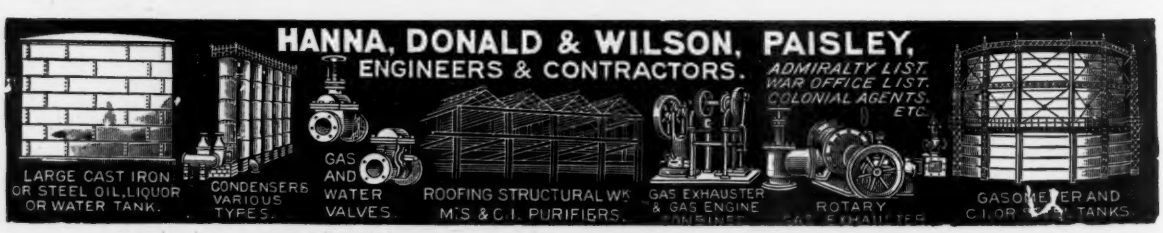
THE LEAD WOOL COMPANY,
SNODLAND, KENT. LTD.,

T.A. STRENGTH SNODLAND. T.N. 199 SNODLAND.

EVERITT'S PATENT
TAR-FOG EXTRACTOR AND NAPHTHALENE REMOVER,

As adopted at the following Gas-Works: **Salisbury, Ilkley, Kidderminster, Stirling, Ossett, Cleckheaton, Kirkby-in-Ashfield, Longwood, Widnes, Kilmarnock, Wanganui, New Zealand, Uddingston, Southport, Dundee, and Perth.**

SOLE MAKERS:
ROBERT DEMPSTER & SONS,
ROSE MOUNT IRON-WORKS, LTD.,
ELLAND, Yorks.

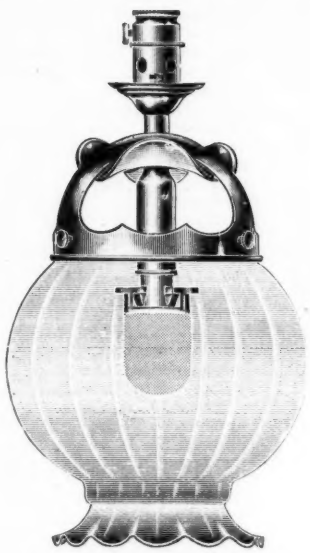

HANNA, DONALD & WILSON, PAISLEY.
ENGINEERS & CONTRACTORS.
ADMIRALTY LIST.
WAR OFFICE LIST.
COLONIAL AGENTS.
ETC.
LARGE CAST IRON OR STEEL OIL, LIQUOR OR WATER TANK.
CONDENSERS VARIOUS TYPES.
GAS AND WATER VALVES.
ROOFING STRUCTURAL WK M'S & C.I. PURIFIERS.
GAS EXHAUSTER & GAS ENGINE
ROTARY
GASOMETER AND C.I. OR S. TANKS.

VERITAS

BRITISH MADE

IMPROVED

INVERTED BURNER.



No. 7477. British Made.

We are now manufacturing the **Veritas Inverted Burner** with a **MIXING CHAMBER**, ensuring a perfect, steady, and noiseless light, and can with confidence recommend this burner for economy and efficiency.

Can also be fitted with our **Patent Gas Regulator** enabling the nipple to be instantly adjusted to suit pressure obtaining at the point of use, and is perfectly accurate and reliable.

Does not impede the Velocity of the flow of gas, and there is no corrosion of the burner nipple.

MADE IN A VARIETY OF FINISHES.

Write for List J 254. Prices Reduced.

MANTLES

FOR

UPRIGHT OR INVERTED BURNERS

FOR

BRILLIANCY

AND

MAINTAINED LIGHTING POWER ARE UNEQUALLED.

The following results from tests made (without our knowledge) of Veritas and other known brands, by the Westminster Testing Laboratory, are convincing.

Duration of Test, 500 hours.

	Mean C.P.	Cub. ft. per hour.	C.P. per cub. ft.
Veritas	75	4·59	16·4
W	72·5	5·17	14·02
G	54	4·95	10·75
B	50·5	6·01	8·4

Average of Three Mantles and Burners of four makes, showing decrease in light during 500 hours.

	Start	100	200	300	400	500 hours.
Veritas ..	82	81	80	76	75	72 C.P.
W ..	80	79	75	72	69	67 „
G ..	75	64	56	48	38	25 „
B ..	59	54	49	46	43	41 „

SAMPLES AND PRICES ON APPLICATION.

FALK, STADELMANN & CO., LTD.

VERITAS LIGHT COMPANY,

LONDON, & **GLASGOW,**

83, 85, and 87, Farringdon Road, 74, 76, and 78, Great Clyde Street.

P.S.—When in London we invite inspection of our VERITAS MANTLE FACTORY.

HUMPHREYS & GLASGOW,

36 & 38, VICTORIA STREET, LONDON, S.W.

BUREAU DE BRUXELLES: 209, CHAUSSÉE D'IXELLES.

UNITED STATES OFFICE: 165, BROADWAY, NEW YORK.

	Cubic Feet Daily.
Aarhus, Denmark	800,000
Agram, Croatia	200,000
Alkmaar, Holland	400,000
Antwerp, Belgium	1,500,000
Antwerp, (2nd)	1,000,000
Ashford	250,000
Augsburg, Bavaria	425,000
Aylesbury	150,000
Barmen-Rittershausen	500,000
Barrow	300,000
Bath	1,000,000
Belfast	1,700,000
Belfast (2nd)	4,500,000
Berlin—Charlottenburg	2,500,000
Berlin—Rixdorf	650,000
Berlin—Rixdorf (2nd)	700,000
Berlin—Tegel	3,500,000
Birmingham	1,500,000
Bishop's Stortford	200,000
Bochum, Westphalia	530,000
Bognor	100,000
Bordentown, N.J.	125,000
Bournemouth	1,000,000
Bournemouth (2nd)	500,000
Bremen, Germany	550,000
Bremen (2nd)	950,000
Brentford	1,200,000
Bridgwater	200,000
Bridlington	150,000
Bridlington (2nd)	200,000
Brieg, Silesia	100,000
Brighton	1,750,000
Brighton (2nd)	1,850,000
Bruges, Belgium	200,000
Brussels—Anderlecht	350,000
Brussels—Anderlecht (2nd)	350,000
Brussels—Forest	1,000,000
Brussels—Koekelberg	1,000,000
Brussels—St. Gilles	1,000,000
Brussels—St. Josse	1,000,000
Brussels—St. Josse (2nd)	600,000
Brussels—Ville	750,000
Brussels—Ville (2nd)	750,000
Brussels—Ville (3rd)	1,500,000
Brussels—Ville (4th)	350,000
Budapest, Hungary	50,000
Budapest (2nd)	1,750,000
Carlisle	600,000
Carlsruhe, Germany	500,000
Chigwell	350,000
Chorley	300,000
Commercial, London	850,000
Commercial (2nd)	850,000
Commercial (3rd)	1,250,000
Commercial (4th)	2,000,000
Copenhagen	700,000
Copenhagen (2nd)	2,500,000
Coventry	600,000
Coventry (2nd)	600,000
Cracow, Galicia	200,000
Crefeld, Germany	500,000
Croydon	1,250,000
Croydon (2nd)	625,000
Croydon (3rd)	625,000
Deventer, Holland	150,000
Deventer (2nd)	200,000
Dorking	150,000
Dublin	2,000,000
Dublin (2nd)	2,000,000
Dublin (3rd)	650,000
Dundee	1,500,000
Dunedin, N.Z.	150,000
Dunedin, N.Z. (2nd)	275,000
Durham	200,000
Düsseldorf, Germany	1,000,000
Eastbourne	1,250,000
Edinburgh	2,000,000
Epsom	225,000
Falmouth	150,000
Faversham	200,000
Flensburg, Sleswig	300,000
Forst, Brandenburg	300,000
G. L. & C. Co., Beckton	2,250,000
G. L. & C. Co., „ (2nd)	10,750,000
G. L. & C. Co., Bromley	3,750,000
G. L. & C. Co., Fulham	1,750,000
G. L. & C. Co., Nine Elms	2,750,000
Gelsenkirchen, Westphalia	175,000
Gelsenkirchen (2nd)	350,000
Geneva, Switz.	500,000
Gosport	200,000
Göteborg, Sweden	300,000
Göteborg, (2nd)	600,000
Graudenz, Prussia	200,000
Guildford	350,000
Guildford (2nd)	200,000
Haarlem, Holland	850,000
Hamburg, Germany	1,750,000
Hampton Court	500,000
Hartlepool	750,000
Hebden Bridge	200,000
Heidelberg, Germany	200,000
Holyoke, Mass.	600,000
Hong Kong	450,000
Hull	1,500,000
Innsbruck, Austria	200,000
Ipswich	750,000
Kampen, Holland	350,000
Kiel, Sleswig	1,000,000
L. & N.W. Rly., Crewe	700,000
Lausanne, Switz.	250,000
Lawrence, Mass.	400,000
Lea Bridge	350,000
Lea Bridge (2nd)	350,000
Lea Bridge (3rd)	400,000
Leeuwarden, Holland	400,000
Leiden, Holland	500,000
Leigh, Lancs.	350,000
Lemberg, Galicia	260,000
Liége, Belgium	1,000,000
Liége (2nd)	750,000
Lincoln	500,000
Liverpool	3,500,000
Liverpool (2nd)	4,500,000
Longton	600,000
Maastricht, Holland	200,000
Magdeburg, Germany	1,400,000
Maidenhead	225,000
Maidenhead (2nd)	225,000
Maidstone	500,000
Malmö, Sweden	350,000
Malta	400,000
Manchester	3,500,000
Manchester (2nd)	3,500,000
Marlborough	100,000
Mayence, Germany	700,000
McKeesport, Pa.	500,000
Merthyr Tydfil	300,000
Middlesbrough	1,250,000
Nelson	400,000
Newburgh, N.Y.	600,000
New York	5,200,000
Nictheroy, Brazil	250,000
North Middlesex	150,000
North Middlesex (2nd)	200,000
North Middlesex (3rd)	75,000
Norwich	1,000,000
Norwich (2nd)	300,000
Nuneaton	125,000
Oberhausen, Germany	175,000
Ostend, Belgium	100,000
Ostend (2nd)	200,000
Perth, W.A.	125,000
Poole	1,500,000
Port Elizabeth, S.A.	400,000
Portsmouth	1,000,000
Posen, Germany	450,000
Posen, (2nd)	700,000
Preston	1,400,000
Reading	1,000,000
Redhill	275,000
Redhill (2nd)	300,000
Reichenberg, Bohemia	200,000
Reichenberg (2nd)	200,000
Reval, Russia	350,000
Romford	300,000
Romford (2nd)	350,000
Rotterdam, Holland	850,000
Rotterdam (2nd)	1,500,000
Rotterdam (3rd)	750,000
Rotterdam (4th)	750,000
Rotterdam (5th)	600,000
St. Gallen, Switz.	225,000
St. Gallen (2nd)	225,000
St. Joseph, Mo.	750,000
San Paulo, Brazil	700,000
Santiago de Cuba	400,000
Scarborough	800,000
Schwelm, Westphalia	100,000
Shanghai	225,000
Shanghai (2nd)	225,000
Shanghai (3rd)	1,600,000
Southampton	800,000
Southampton (2nd)	500,000
Southgate	400,000
Southport	750,000
Southport (2nd)	900,000
South Shields	650,000
Stafford	500,000
Staines	600,000
Stockholm	1,500,000
Stockholm (2nd)	1,750,000
Stockport	600,000
Stockport (2nd)	600,000
Stockport (3rd)	400,000
Stockton-on-Tees	500,000
Swansea	750,000
Swansea (2nd)	1,000,000
Swindon	300,000
Sydney—Harbour	500,000
Sydney—Harbour (2nd)	500,000
Sydney—Mortlake	500,000
Sydney—Mortlake (2nd)	500,000
Syracuse, N.Y.	850,000
Taunton	225,000
Taunton (2nd)	350,000
The Hague, Holland	1,000,000
The Hague (2nd)	500,000
Tilburg, Holland	400,000
Tottenham	750,000
Tottenham (2nd)	750,000
Tottenham (3rd)	350,000
Tottenham (4th)	1,000,000
Tottenham (5th)	1,000,000
Tunbridge Wells	1,000,000
Utrecht, Holland	1,000,000
Utrecht (2nd)	1,000,000
Verviers, Belgium	1,000,000
Vienna	3,500,000
Waltham	400,000
Wandsworth & Putney	1,800,000
Watford	300,000
Watford (2nd)	350,000
Wiesbaden, Germany	850,000
Wellington, N.Z.	350,000
West Ham	1,500,000
West Ham (2nd)	800,000
Weston-super-Mare	350,000
Weston (2nd)	350,000
Wexford, Ireland	100,000
Winchester	225,000
Winchester (2nd)	125,000
Zwolle, Holland	200,000
Zwolle (2nd)	200,000

AND SINCE JANUARY 1st, 1908.

G.L.&C. Co.–Fulham (2nd)	750,000	Allenstein, Germany	200,000	Leiden (2nd)	575,000
Ilford	650,000	Brentford (2nd)	850,000	Wolverhampton	1,500,000
Malines, Belgium	500,000	St. Albans	700,000	Frankenthal, Germany	175,000
Louvain, Belgium	800,000	Torquay	350,000	Cracow (2nd)	200,000
Hampton Court (2nd)	600,000	Lemberg (2nd)	500,000	Oldenburg, Germany	200,000
Courtrai, Belgium	250,000	Bremen (3rd)	850,000	Croydon (4th)	550,000
Vienna (2nd)	2,500,000	Southampton (3rd	600,000		

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